DR

On-Site Laboratory Evaluation Report (SDWA)

Date of Report: October 24, 2006

Microbiology

Environmental Microbiology Section
Office of Laboratory Services
Bureau for Public Health
West Virginia Department of Health and Human Services
167 11th Avenue
South Charleston, WV 25303

Date of Assessment: September 19-20, 2006

by

David E. Russell

U.S. Environmental Protection Agency, Region III
Office of Analytical Services and Quality Assurance
701 Mapes Road
Fort Meade, MD 20755-5350

A. Introduction:

On September 19-20, 2006, an evaluation of the Environmental Microbiology Section of the West Virginia Office of Laboratory Services, located in Charleston, was conducted to determine the capability of the Laboratory to perform its mission as it relates to the Safe Drinking Water Act. The Laboratory was last evaluated in June, 2003.

The Environmental Microbiology Section (hereafter, the Laboratory) is currently analyzing drinking water for total coliform and fecal coliform (or *Escherichia coli*) using either Multiple Tube Fermentation (MTF) or Colilert. Although not performed routinely, the Laboratory also has the capability to analyze drinking water using Membrane Filtration (MF). In addition, Heterotrophic Plate Counts (HPC), using the pour plate method, are regularly performed, but not on drinking water compliance samples. The Laboratory wishes to maintain certification for all four methods: MTF, Colilert, MF, and HPC. In addition, it seeks certification for the quantitative Colilert method (Quanti-tray) in order to comply with the Long-term Enhanced Surface Water Treatment Rule.

The Laboratory is to be congratulated for the record of PT sample analysis it has established over the past three years. In 2004, 2005, and 2006 the Laboratory successfully analyzed PT sample sets using the MTF, Colilert, and MF methods. All three methods were evaluated each year. In 2005, a PT sample set was analyzed using MF, but mistakenly not reported. The Assessor examined the bench sheet and the final results (from ERA, WS103) and determined that the two were in complete agreement. In addition, the Laboratory successfully analyzed a PT sample using the quantitative Colilert method (Quanti-tray).

The equipment and procedures employed in the bacteriological analyses of drinking water by this laboratory conform with the provisions of the *Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition (2005, U.S. EPA), except as described in Sections C and D below.

B. Personnel:

The following personnel currently analyze drinking water or source water for total coliforms, fecal coliforms, (or *E.coli*), or the heterotrophic plate count.

Tom Ong	Microbiologist Supervisor
Mike Flesher	Microbiologist III
Tracey Goodson	Microbiologist III
Carole Moore	Microbiologist II
Deborah Peters	Laboratory Assistant III

The assessor wishes to thank these individuals for their cooperation and assistance during the on-site evaluation. Tom Ong was especially helpful and generous with his time.

C. General Findings:

General Findings include specific incidences of non-conformance with the equipment and analytical procedures required by the *Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition (2005, U.S. EPA), or laboratory procedures that, in the opinion of the assessor, jeopardize the generation of valid data.

There are no general findings.

D. Recommendations:

The following remarks are offered as suggestions to help improve the quality and integrity of the data the Laboratory generates. Note that all paragraph numbers and quotes are from Chapter V of the *Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition (2005, U.S. EPA) unless otherwise indicated.

1. The Laboratory's "Water Bacteriological Report" was revised in July, 2006, and a number of improvements were made over the previous version. It now contains extensive information on sample collection and analysis. Particularly noteworthy, are the sample rejection criteria listed on the form, so that in the event a sample is rejected, the reason for rejection is indicated. In some cases a sample may be analyzed even though it failed to meet a required holding time or transport temperature. In such cases a box on the report form labeled "Not valid for SDWA compliance reporting" is checked. The Laboratory is to be commended for this practice. A problem arises, however, when the same results are entered into the Laboratory's computer database (an MS Access database) and the data is sent via the internet to the Environmental Engineering Section of the Office of Environmental Services. The flag noted above ("Not valid for SDWA compliance reporting") is not included. Consequently, there are two reports routinely sent to the Environmental Engineering Section: the paper "Water Bacteriological Report" which contains, when appropriate, the "Not valid for SDWA compliance reporting" qualification, and the electronic report in the MS Access database, sent via the internet, that does not contain the same qualification, when it should. It is the assessor's understanding that the Environmental Engineering Section only reviews the electronic report and not the paper report, which means the qualification indicated on the latter is never actually communicated to the Environmental Engineering Section. Based on conversations with lab personnel, it is clear that the database design is overdue for updating. Unfortunately, the database was developed by a contractor no longer under contract with the Environmental Engineering Section. Nonetheless, it may be possible for state IT personnel to update the MS Access database design. The database needs a comment field in which comments qualifying the results (such as, "Not valid for SDWA compliance reporting") could be placed. In addition, there are difficulties associated with correctly indicating in the database the reason for sample rejection and by whom the sample was collected. Updating the database design should be done with the input of those in the laboratory using the

Ex. 5 - Deliberative

database.

2. Both paragraph 6.3.1 and the Federal Register (40 CFR 141.21(f)(3) footnote 2), in regard to the collection of drinking water samples from distribution systems, state, "Systems are encouraged but not required to hold samples below 10°C during transit." Accordingly, it is recommended that distribution system samples be held below 10°C during transit and that this condition be documented through the use of a temperature blank, the temperature of which would be determined upon arrival at the Laboratory and recorded.

3. According to paragraph 3.4.1, incubator "thermometers should be placed on the top and bottom shelves of the use area". In the Laboratory's incubators, the two thermometers are on adjacent shelves. They should be on shelves well separated from one another (if not the top and bottom shelves) so as to provide a better representation of the incubator's internal temperature. The purpose of the greater spacing is to document that the air temperature is uniform throughout the inside of the incubator.

4. The record of autoclave maintenance is inadequate in that it only consists of a few lines recorded on a clip board kept in the lab. It is recommended that the Laboratory keep copies of the service technician's maintenance reports and a copy of the current autoclave maintenance contract in the autoclave laboratory.

5. Paragraph 5.1.6 lists the information concerning media preparation that should be recorded. It includes "lot number" and the results of checks with "positive and negative" control cultures. The current documentation of media preparation could be improved by recording manufacturer's lot number, and the results of a true negative control check. A negative control is a bacterial species that will not grow in the media or will not produce a positive result. A check for media sterility is an important QC item, but it is not the "negative control" check.

6. Currently, for each control check, a new IDEXX Quanti-cult preparation is used as the source of the control bacteria, and subsequently discarded. A stock culture (agar slant) is used as the source of *Proteus mirabilus*, a non-lactose fermenter; however, the purity of this culture is not periodically checked as recommended in paragraph 5.1.6.4. The Laboratory should perform this check periodically, record the results, and take corrective action if necessary.

7. The Laboratory should consider requiring the use of UV-absorbing safety glasses when laboratory personnel use the UV lamp to evaluate Colilert tests. Such safety glasses are currently not used.

8. According to paragraph 4.4.3 each lot of commercially-prepared dilution water should be checked for sterility. The Laboratory checks laboratory-prepared media and dilution water for sterility, but not commercially-prepared dilution water. Sterility checks of each new lot of commercially-prepared dilution water should be initiated and recorded.

E. General Comments:

1. The Laboratory has done an excellent job of updating, once again, the Water Bacteriological Report, incorporating all the requirements listed in paragraph 6.5 and many recommendations from prior on-sites evaluations. The report form serves to document and communicate key information. The updated form is a good example of the Laboratory's commitment to continuous improvement.

2. The Laboratory is also to be commended for the routine practice of rejecting samples (without analysis) for the reasons listed on the Water Bacteriological Report.

3. The Laboratory is to be further commended for the extensive QC performed and documented, much of which is done at a frequency greater than that required by the SDWA Manual.

F. Conclusions:

The Laboratory's management and staff are to be commended for their dedication to maintaining high standards in microbiological analysis and remaining committed to continual improvement. As shown in the table below, full certification will be recommended for Colilert (presence/absence and quantitative techniques), Multiple-Tube Fermentation, Membrane Filtration, and Heterotrophic Plate Count.

G. Certification Status (Recommended by the Certification Officer):

TECHNIQUE	METHOD[1]	CERTIFICATION STATUS
ONPG-MUG Test (Colilert - Presence/Absence)	SM 9223	Certified
ONPG-MUG Test (Colilert - Quantitative)	SM 9223	Certified
Fermentation	SM 9221B,E	Certified
Membrane Filtration	SM 9222B	Certified
Heterotrophic Plate Count	SM9215B	Certified

[1] *Standard Methods for the Examination of Water and Wastewater*, 20th Edition.

H. Assessor:

David E. Russell
Microbiological Assessor

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D. Recommendations:

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Membrane Filtration	SM 9222B	Certified
Heterotrophic Plate Count	SM9215B	Certified

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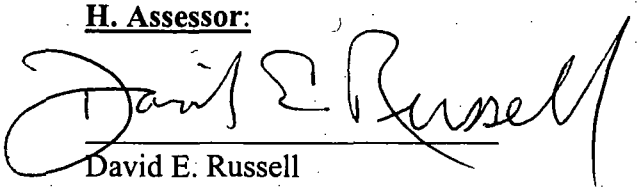
H. Assessor:



David E. Russell
Microbiological Assessor

For '09

"Tom Ong"
<tomong@wvdhhr.org>

11/12/2008 04:09 PM

To Dave Russell/ESC/R3/USEPA/US@EPA, Joe Slayton/ESC/R3/USEPA/US@EPA, "Ravinder Reddy" <ravinder.reddy@fda.hhs.gov>, "Thomas Graham"
cc "Charlotte Billingsley" <charlottebillingsley@wvdhhr.org>

bcc

Subject WV New Employee

We have a new employee in the Environmental Microbiology Section. Chris Smith transferred in from another section in the laboratory and his

Ex. 6 - Personal Privacy

Thomas L. Ong, Microbiologist Supervisor
Chief - Laboratory Certification Officer
Chief - Laboratory Evaluation Officer
WVDHHR - BPH
Office of Laboratory Services
167 - 11th Avenue
South Charleston, WV 25303
Phone: 304-558-3530, Ext. 2710
email: tomong@wvdhhr.org

"Tom Ong"
<tomong@wvdhhr.org>
06/06/2007 02:40 PM

To Dave Russell/ESC/R3/USEPA/US@EPA, Joe Slayton/ESC/R3/USEPA/US@EPA, "Larry Maturin" <larry.maturin@fda.hhs.gov>, "Thomas Graham"
cc
bcc
Subject WV - New Employee

We have a new Microbiologist, Beth Taylor, Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

Thomas L. Ong, Microbiologist Supervisor
Chief - Laboratory Certification Officer
Chief - Laboratory Evaluation Officer
WVDHHR - BPH
Office of Laboratory Services
167 - 11th Avenue
South Charleston, WV 25303
Phone: 304-558-3530, Ext. 2710
email: tomong@wvdhhr.org

Date 07-03-08

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	Coordination		Justify		

REMARKS

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OPTIONAL FORM 41 (Rev. 1-94)
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Dated: June 10, 2008.

Stephen S. Tuber,

Assistant Regional Administrator, Office of Partnerships and Regulatory Assistance, EPA, Region 8.

Dated: June 10, 2008.

Alexis Strauss,

Director, Water Division, EPA, Region 9.

Dated: June 11, 2008.

Michael Lidgard,

Acting Director, Office of Water and Watersheds, EPA, Region 10.

[FR Doc. E8–13615 Filed 6–16–08; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–8580–7]

Notice of Tentative Approval and Solicitation of Request for a Public Hearing for Public Water System Supervision Program Revisions for the State of West Virginia

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Tentative Approval and Solicitation of Requests for a Public Hearing.

SUMMARY: Notice is hereby given that the State of West Virginia is revising their Public Water Supply Supervision (PWSS) program to meet the requirements of Section 1413 of the Safe Drinking Water Act. West Virginia has adopted regulations for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) to improve public health protection through the control of microbiological contaminants by targeting additional *Cryptosporidium* treatment requirements to higher risk systems, and for the Stage 2 Disinfection By-Products Rule (Stage 2) to reduce exposure to Disinfection By-Products (DBP) by requiring systems to meet maximum contaminant levels as an average at each compliance monitoring location, rather than as a system-wide average, for two groups of DBPs, trihalomethanes (TTHM) and five haloacetic acids (HAA5).

EPA has determined that these revisions are no less stringent than the corresponding Federal regulations. Therefore, EPA has decided to tentatively approve these program revisions. All interested parties are invited to submit written comments on this determination and may request a public hearing.

DATES: Comments or a request for a public hearing must be submitted by July 17, 2008. This determination shall become effective on July 17, 2008 if no timely and appropriate request for a hearing is received and the Regional Administrator does not elect to hold a hearing on his own motion, and if no comments are received which cause EPA to modify its tentative approval.

ADDRESSES: Comments or a request for a public hearing must be submitted to the U.S. Environmental Protection Agency Region III, 1650 Arch Street, Philadelphia, PA 19103–2029. All documents relating to this determination are available for inspection between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, at the following offices:

- Drinking Water Branch, Water Protection Division, U.S. Environmental Protection Agency Region III, 1650 Arch Street, Philadelphia, PA 19103–2029.
- West Virginia Department of Health and Human Resources, Environmental Engineering Division, Capitol and Washington Streets, 1 Davis Square, Suite 200, Charleston, WV 25301–1798.

FOR FURTHER INFORMATION CONTACT: Michelle Moustakas, Drinking Water Branch (3WP21) at the Philadelphia address given above; telephone (215) 814–5741 or fax (215) 814–2318.

SUPPLEMENTARY INFORMATION: All interested parties are invited to submit written comments on this determination and may request a public hearing. All comments will be considered, and, if necessary, EPA will issue a response. Frivolous or insubstantial requests for a hearing may be denied by the Regional Administrator. However, if a substantial request for a public hearing is made by July 17, 2008, a public hearing will be held. A request for public hearing shall include the following: (1) The name, address, and telephone number of the individual, organization, or other entity requesting a hearing; (2) a brief statement of the requesting person's interest in the Regional Administrator's determination and of information that the requesting person intends to submit at such a hearing; and (3) the signature of the individual making the request; or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

Dated: June 5, 2008.

Donald S. Welsh,

Regional Administrator, Region III.

[FR Doc. E8–13614 Filed 6–16–08; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL MARITIME COMMISSION

[Docket No. 08–03]

Maher Terminal, LLC, v. The Port Authority of New York and New Jersey; Notice of Filing of Complaint and Assignment

Notice is given that a complaint has been filed with the Federal Maritime Commission ("Commission") by Maher Terminal, LLC. Complainant asserts that it is a limited liability company registered in the State of Delaware with corporate offices and facilities located in Elizabeth, New Jersey. Complainant asserts that Respondent, The Port Authority of New York and New Jersey ("PANYNJ"), is a body corporate and politic created by Compact between the States of New York and New Jersey and with the consent of the Congress; has offices located in New York, New York; owns marine terminal facilities in the New York-New Jersey area, including in Elizabeth, New Jersey; and is a marine terminal operator within the meaning of the Shipping Act of 1984, as amended ("The Shipping Act"). *See* 46 U.S.C. 40102(14). Complainant contends that Respondent violated sections 41102(c) and 41106(2) and (3) of The Shipping Act, respectively, by: (1) Failing to establish, observe and enforce just and reasonable practices with respect to Complainant; (2) giving undue or unreasonable preference or advantage to APMT and imposing undue or unreasonable prejudice or disadvantage with respect to Complainant; and (3) unreasonably refusing to deal or negotiate with Complainant. 46 U.S.C. 41102(c), 41106(2)–(3).

Specifically, Complainant alleges that Respondent's lease agreement EP–248 with APM Terminals North America, Inc., formerly known as Maersk Container Service Company, Inc. ("APMT"), grants to APMT unduly and unreasonably more favorable lease terms than Respondent provides to Complainant in lease agreement EP–249. These agreements, Complainant avers, are filed with the Commission as FMC Agreement Nos. 201106 and 201131, respectively. Complainant contends that the lease terms which disadvantage Complainant include, but are not limited to, the annual rental rate per acre, investment requirements, throughput requirements, a first point of rest requirement for automobiles, and the security deposit requirement.

Complainant asserts that it has sustained injuries and damages, as a result of Respondent's actions, including but not limited to higher rents, costs, and other undue and unreasonable payments and obligations

Dated: June 10, 2008.
Stephen S. Tuber,
Assistant Regional Administrator, Office of Partnerships and Regulatory Assistance, EPA, Region 8.

Dated: June 10, 2008.
Alexis Strauss,
Director, Water Division, EPA, Region 9.

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Michael Lidgard,
Acting Director, Office of Water and Watersheds, EPA, Region 10.

[FR Doc. E8–13615 Filed 6–16–08; 8:45 am]
BILLING CODE 6560–50–P

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[FRL–8580–7]

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[Docket No. 08–03]

Maher Terminal, LLC, v. The Port Authority of New York and New Jersey; Notice of Filing of Complaint and Assignment

Notice is given that a complaint has been filed with the Federal Maritime Commission ("Commission") by Maher Terminal, LLC. Complainant asserts that it is a limited liability company registered in the State of Delaware with corporate offices and facilities located in Elizabeth, New Jersey. Complainant asserts that Respondent, The Port Authority of New York and New Jersey ("PANYNJ"), is a body corporate and politic created by Compact between the States of New York and New Jersey and with the consent of the Congress; has offices located in New York, New York; owns marine terminal facilities in the New York-New Jersey area, including in Elizabeth, New Jersey; and is a marine terminal operator within the meaning of the Shipping Act of 1984, as amended ("The Shipping Act"). *See* 46 U.S.C. 40102(14). Complainant contends that Respondent violated sections 41102(c) and 41106(2) and (3) of The Shipping Act, respectively, by: (1) Failing to establish, observe and enforce just and reasonable practices with respect to Complainant; (2) giving undue or unreasonable preference or advantage to APMT and imposing undue or unreasonable prejudice or disadvantage with respect to Complainant; and (3) unreasonably refusing to deal or negotiate with Complainant. 46 U.S.C. 41102(c), 41106(2)–(3).

Specifically, Complainant alleges that Respondent's lease agreement EP–248 with APM Terminals North America, Inc., formerly known as Maersk Container Service Company, Inc. ("APMT"), grants to APMT unduly and unreasonably more favorable lease terms than Respondent provides to Complainant in lease agreement EP–249. These agreements, Complainant avers, are filed with the Commission as FMC Agreement Nos. 201106 and 201131, respectively. Complainant contends that the lease terms which disadvantage Complainant include, but are not limited to, the annual rental rate per acre, investment requirements, throughput requirements, a first point of rest requirement for automobiles, and the security deposit requirement.

Complainant asserts that it has sustained injuries and damages, as a result of Respondent's actions, including but not limited to higher rents, costs, and other undue and unreasonable payments and obligations

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03/15/2007 04:12 PM

To Dave Russell/ESC/R3/USEPA/US@EPA, Joe Slayton/ESC/R3/USEPA/US@EPA
cc
bcc
Subject WV - Env Micro Personnel Change

Ex. 6 - Personal Privacy

Thomas L. Ong, Microbiologist Supervisor
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Chief - Laboratory Evaluation Officer
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04/14/2008 04:52 PM

To Dave Russell/ESC/R3/USEPA/US@EPA, Joe Slayton/ESC/R3/USEPA/US@EPA, <leoreports@fda.hhs.gov>
cc "Charlotte Billingsley" <charlottebillingsley@wvdhhr.org>
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Subject WV-Analyst Change

Ex. 6 - Personal Privacy

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SDWA Checklist (in EXCEL)

Laboratory *Month Day, Year* *Certification Officer*

ELEMENT	ITEM	Y/N/O	COMMENTS
1. PERSONNEL			
Supervisor/Consultant	**1.1**		
Does the supervisor of the microbiology laboratory have a bachelor's degree in microbiology, biology, or equivalent?		Y	
Has a supervisor with a degree in a subject other than those listed above had at least one college-level microbiology laboratory course in which environmental microbiology was covered?		O	
In addition, has the supervisor had a minimum of two weeks training at a Federal or State agency or academic institution in microbiological analysis of drinking water or 80 hours of on-the-job training in water microbiology at a certified laboratory, or other training acceptable to the State or EPA?		Y	
If a supervisor is not available, and a waiver has not been granted as per Section 1.3, is a consultant with the same qualifications substituted?		O	
If a supervisor is not available, and a waiver has not been granted as per Section 1.3, is a consultant with the same qualifications substituted?		O	
Can the laboratory supervisor demonstrate that all laboratory personnel have the ability to satisfactorily perform the analyses to which they are assigned?		Y	
Can the laboratory supervisor demonstrate that all data reported by the laboratory meets the required quality assurance and regulatory criteria?		Y	
Analyst (or equivalent job title)	**1.2**		
Does the analyst have at least a high school education, a minimum of three months bench experience in water, milk or food microbiology, training in microbiological analysis of drinking water acceptable to the State (or EPA), and a minimum of 30 days on-the-job training under an experienced analyst?		Y	
Has the analyst demonstrated acceptable results on unknown samples before analyzing compliance samples?		Y	
Waiver of Academic Training	**1.3**		
Has the certification authority waived the need for the above specified academic training for highly experienced analysts in this laboratory?		O	
Has the certification authority waived the need for the above specified training for supervisors of laboratories associated with drinking water systems that only analyze samples from that system?		O	
If yes to either of the above, does the laboratory have a copy of that written and signed waiver available for inspection?		O	
Personnel Records	**1.4**		
Does the laboratory maintain personnel records on laboratory analysts that include academic background, specialized training courses completed, and types of microbiological analyses conducted?		Y	
2. LABORATORY FACILITIES			
Does the laboratory have facilities that are clean and temperature and humidity controlled, and with adequate lighting at the bench tops?		Y	
Does the laboratory maintain effective separation of incompatible testing areas?		Y	
Does the laboratory control access where appropriate, and minimize traffic flow through the work areas?		Y	
Does the laboratory ensure that contamination does not adversely affect data Quality?		Y	
Does the laboratory have bench tops and floors that are easily cleaned and disinfected?		Y	
Does the laboratory have sufficient space for processing samples; storage space for media, glassware, and portable equipment; floor space for stationary equipment; and areas for cleaning glassware and sterilizing materials?		Y	
Does the laboratory have provisions for disposal of microbiological wastes?		Y	
3. LABORATORY EQUIPMENT AND SUPPLIES			
Does the laboratory have the equipment and supplies needed to perform the approved methods for which certification has been requested?		Y	
pH meter	**3.1**		
Are accuracy and scale graduations within ±0.1 units?	3.1.1	Y	
Are pH buffer aliquots used only once?	3.1.2	Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
Are electrodes maintained according to the manufacturer's recommendations?	3.1.3	Y	
QC Are pH meters standardized before each use period with pH 7.0 and either 4.0 or 10.0 standard buffers, whichever covers the desired pH of the media or	3.1.4	Y	
QC Are both the date and buffers used recorded in a logbook along with the analyst's initials?		Y	
QC Is the pH slope recorded monthly, after calibration?	3.1.5	Y	
QC If the pH meter does not have a feature to automatically calculate the slope, but canprovide in the pH in millivolts, is the formula in Section 3.1.5.1 used to calculate the slope?	3.1.5.2	O	
QC If the slope is below 95% or above 105%, are the manufacturer's instructions followed for meter or electrode maintenance and general cleaning?	3.1.6	Y	
QC Are commercial pH buffer solutions dated when received and when opened?		Y	
QC Are pH buffer solutions discarded by the expiration date?		Y	
Balance (top loader or pan)	**3.2**		
Does the balance have a readability of 0.1 g?	3.2.1	Y	
Does the balance have a sensitivity of at least 0.1 g for a load of 150 g, and 1 mg for a load of 10 g or less?	3.2.2	Y	
QC Are the balances calibrated monthly using ASTM Class 1, 2, or 3 weights (minimum 3 traceable weights which bracket laboratory weighing needs, with a readability of 0.1 g)?	3.2.3	Y	
QC Are non-reference weights calibrated every six months with reference weights?		O	
QC Are calibrations recorded in a logbook with the initials of the individual performing the calibration?		Y	
QC Are correction values on file and used?		O	
QC Are reference weights re-certified every five years?		Y	
QC Are damaged or corroded weights replaced?		Y	
QC Are service contracts or internal maintenance protocols and maintenance records available?	3.2.4	Y	
QC Is maintenance, calibration, and cleaning conducted at least annually by a qualified independent technician, unless the need is modified or waived by the		Y	
Temperature Monitoring Device	**3.3**		
Are glass, dial, or electronic thermometers graduated in 0.5°C increments (0.2°C increments for tests which are incubated at 44.5°C) or less, except as noted for hot air ovens (Section 3.6.1) and refrigerators (Section 3.9.1)?	3.3.1	Y	
Does observation of glass thermometers indicate no separation in fluid columns?		Y	
Are only dial thermometers which can be adjusted used?		O	
QC Are glass and electronic thermometers calibrated annually and dial thermometers quarterly at the temperature used, against a NIST-traceable reference thermometer or one that meets the requirements of NBS Monograph SP 250-23?	3.3.2	Y	
QC Are both the calibration factor and calibration date indicated on the		Y	
QC Is the following calibration information recorded in a QC record book?			
- Serial number of the laboratory thermometer		Y	
- Serial number of the NIST-traceable thermometer (or other reference thermometer)		Y	
- Temperature of the laboratory thermometer		Y	
- Temperature of the NIST-traceable thermometer (or other reference		Y	
- Correction (or calibration) factor		Y	
- Date of check		Y	
- Analyst's initials		Y	
QC Is the thermometer discarded if it differs by more than 1°C from the reference thermometer?	3.3.3	Y	
QC Are reference thermometers recalibrated at least every five years?		Y	
QC Is reference thermometer calibration documentation maintained?		Y	
QC Are continuous recording devices used to monitor incubator temperature recalibrated at least annually, using a reference thermometer that meets the specifications noted in Section 3.3.2?		O	

ELEMENT	ITEM	Y/N/O	COMMENTS
Incubator Unit	**3.4**		
Do incubator units have an internal temperature monitoring device and maintain a temperature specified by the method used, usually 35°±0.5°C and 44.5°±0.2°C?	3.4.1	Y	
For non-portable incubators, are thermometers placed on top and bottom shelves of the use area and immersed in liquid as directed by the manufacturer (except for electronic thermometers)?		Y	
When aluminum block incubators are used, do culture dishes and tubes fit snugly?		O	
QC Is the calibration-corrected temperature recorded for each thermometer being used at least twice per day during each day the incubator is in use?	3.4.2	Y	
QC Are these readings separated by at least four hours?		Y	
QC Does the documentation include the date and time of reading, temperature, and technician's initials?		Y	
If a circulating water bath is used, is it equipped with a gable cover to ensure an incubation temperature of 44.5°±0.2°C?		Y	
Autoclave	**3.5**		
Does the autoclave have an internal heat source, a temperature gauge with a sensor on the exhaust, a pressure gauge, and an operational safety valve?	3.5.1	Y	
Can the autoclave maintain a sterilization temperature during the sterilizing cycle and complete an entire cycle within 45 minutes when a 12-15 minute sterilization period is used?		Y	
Does the autoclave depressurize slowly enough to ensure that media will not boil over and bubbles will not form in inverted tubes?		Y	
QC Is the following information recorded each time the autoclave is used?	3.5.3		
- Date		Y	
- Contents		Y	
- Sterilization time and temperature		Y	
- Total time in the autoclave		Y	
- Analyst's initials		Y	
QC Are copies of the service contracts or internal maintenance protocols and maintenance records kept?		Y	
QC Is maintenance conducted at least annually?		Y	Bi Monthly
QC Is a record of the most recent service performed on file and available for inspection?		Y	
QC Is a maximum-temperature-registering thermometer, electronic temperature readout device, or continuous recording device used each autoclave cycle to ensure that the proper temperature was reached?	3.5.4	Y	
QC Is the temperature recorded?		Y	
QC Is overcrowding avoided?		Y	
QC Are spore strips or spore ampules used monthly as bioindicators to confirm sterilization?		Y	
QC Are automatic timing mechanisms checked quarterly with a stopwatch or other accurate timepiece or time signal, and the results recorded and initialed?	3.5.5	Y	
Are autoclave door seals clean and free of caramelized media?	3.5.6	Y	
Are autoclave drain screens cleaned frequently and debris removed?		Y	
Hot Air Oven	**3.6**		
Does the oven maintain a stable sterilization temperature of 170°-180°C for at least two hours?	3.6.1	O	
Is overcrowding avoided?		O	
Is the oven thermometer graduated in 10°C increments or less, with the bulb placed in sand during use?		O	
QC Is the following information recorded for each cycle?	3.6.2		
- Date		O	
- Contents		O	
- Sterilization time and temperature		O	
- Analyst's initials		O	
QC Are spore strips used monthly to confirm sterilization?	3.6.3	O	
Colony Counter	**3.7**		

ELEMENT	ITEM	Y/N/O	COMMENTS
Is a dark field colony counter used to count Heterotrophic Plate Count colonies?		Y	
Conductivity Meter	**3.8**		
Are meters suitable for checking laboratory reagent-grade water and readable in units of either micromhos/cm or microsiemens/cm	3.8.1	Y	
QC Is the meter calibrated at least monthly, following the manufacturer's recommendations and using an appropriate certified and traceable low-level standard?	3.8.2	Y	
QC If the meter cannot be calibrated as noted above, is the cell constant determined at monthly intervals using a method in Standard Methods, Section 2510?		O	
Is an in-line unit that cannot be calibrated used to check reagent-grade water?	3.8.3	O	
Refrigerator	**3.9**		
Does the refrigerator maintain a temperature of 1°-5°C?	3.9.1	Y	
Is the refrigerator thermometer graduated in at least 1°C increments and the thermometer bulb immersed in liquid?		Y	
QC On days the refrigerator is in use, and the laboratory is staffed, is the calibrated-corrected temperature recorded at least once per day?	3.9.2	Y	
Inoculating Equipment	**3.10**		
Are sterile metal or disposable plastic loops, wood applicator sticks, sterile swabs, or sterile plastic disposable pipet tips used?		Y	
Are wood applicator sticks, if used, sterilized by dry heat?		O	
Are metal inoculating loops and/or needles made of nickel alloy or platinum?		O	
Membrane Filtration (MF) Equipment	**3.11**		
Are MF units made of stainless steel, glass, porcelain, or autoclavable plastic?	3.11.1	Y	
Are they scratched, corroded, or leaking?		N	
QC If graduations on clear or plastic funnels are used to measure sample volume, is their accuracy checked with a Class B graduated cylinder or better (or other Class B glassware) and a record of this calibration check retained?	3.11.2	O	how is 100mL meas.
Is a 10x to 15x stereo microscope with a fluorescent light source used to count sheen colonies?	3.11.3	Y	
Are the membrane filters approved by the manufacturer for total coliform water analysis?	3.11.4	Y	
Are membrane filters to be used cellulose ester, white, gridmarked, 47 mm diameter, and 0.45 μm pore size?		Y	
If alternate pore sizes are used, does the manufacturer provide performance data equal to or better than the 0.45 μm pore size?		O	
Are membrane filters and pads purchased presterilized or autoclaved for 10 minutes at 121°C before use?		Y	
QC Is the lot number for membrane filters and the date received recorded?	3.11.5	Y	
QC Are the membranes checked to see that they are not brittle or distorted?		Y	
QC Are the manufacturer's specification/certification sheets available?		Y	
Are the forceps blunt and smooth-tipped without corrugations on the inner sides of the tips?	3.11.6	Y	
Culture Dishes (loose or tight lids)	**3.12**		
Are presterilized plastic or sterilizable glass culture dishes used?	3.12.1	Y	
Is the sterility of the glass culture dishes maintained by placement in stainless steel or aluminum canisters or a wrap of heavy aluminum foil or char-resistant paper?		Y	
Are loose-lid petri dishes incubated in a tight-fitting container with a moistened paper towel?	3.12.2	Y	
Are opened packs of disposable culture dishes resealed between use periods?	3.12.3	Y	
For membrane filter methods, are culture dishes of an appropriate size to allow the transfer of a single membrane per plate?	3.12.4	Y	
Pipets	**3.13**		
Are glass pipets sterilized and maintained in stainless steel or aluminum canisters or wrapped individually in char-resistant paper or aluminum foil?	3.13.1	O	

ELEMENT	ITEM	Y/N/O	COMMENTS
Do pipets have legible markings and are they not chipped or etched?	3.13.2	Y	
Are opened packs of disposable sterile pipets resealed between use periods?	3.13.3	Y	
Are pipets delivering volumes of 10 mL or less accurate to within a 2.5% tolerance?	3.13.4	Y	
Are calibrated micropipetters used with sterile tips?	3.13.5	Y	
Are micropipetters calibrated annually and adjusted or replaced if the precision or accuracy is greater than 2.5%?		Y	
Glassware and Plasticware	**3.14**		
Is the glassware made of borosilicate glass, or other corrosion-resistant glass, and free of chips and cracks?	3.14.1	Y	
Are markings on graduated cylinders and pipets legible?		Y	
Are plastic items clear and nontoxic to microorganisms?		Y	
QC Are the graduated cylinders used for measurement of sample volumes, or other precalibrated containers that have clearly marked volumes used in lieu of graduated cylinders, accurate to within a 2.5% tolerance?	3.14.2	Y	
Are culture tubes and containers containing fermentation medium of sufficient size to contain medium plus sample without being more than three quarters full?	3.14.3	Y	
Are tube closures made of stainless steel, plastic, aluminum, or screw caps with nontoxic liners?	3.14.4	Y	
Are cotton or foam plugs used?		O	
Sample Containers	**3.15**		
Are sample containers wide-mouth plastic or non-corrosive glass bottles with non-leaking ground glass stoppers or caps with nontoxic liners, sterile plastic bags containing sodium thiosulfate, or other appropriate sample containers?	3.15.1	Y	
Is sample container capacity at least 120 mL (4 oz) to allow at least a 1-inch head space?		Y	
Are glass stoppers covered with aluminum foil or char-resistant paper for sterilization?	3.15.2	O	
Are unsterilized glass and plastic bottles sterilized by autoclaving or, alternatively, by dry oven for glass bottles?	3.15.3	Y	
Are empty containers moistened with several drops of water before autoclaving to prevent an Aair lock@ sterilization failure?		Y	
If chlorinated water is to be analyzed, is sufficient sodium thiosulfate added to the sample bottles before sterilization to neutralize any residual chlorine in the water sample?	3.15.4	Y	
Ultraviolet Lamp (if used)	**3.16**		
Is the germicidal unit disconnected monthly and the lamp cleaned by wiping with soft cloth moistened with ethanol?	3.16.1	O	
Is the longwave unit used for fluorometric tests kept clean?		Y	
QC Is the germicidal unit tested quarterly with a UV light meter or agar spread plate?	3.16.2	O	
QC Is the lamp replaced if it emits less than 70% of its initial output or if an agar spread plate containing 200 to 250 microorganisms, exposed to the UV light for two minutes, does not show a count reduction of 99%?		O	
Spectrophotometer or colorimeter (if used)	**3.17**		
Are wavelengths in the visible range?	3.17.1	O	
QC Is a calibration standard and a method-specific blank analyzed every day the instrument is used, prior to sample analysis?	3.17.2	O	
QC Is this calibration standard obtained from an outside source?		O	
QC Does the calibration standard give a reading in the desired absorbance range?		O	
4. GENERAL LABORATORY PRACTICES			
Are laboratory personnel aware of general and customary safety practices for laboratories?		Y	
Does the laboratory have a safety plan available?		Y	
Does the laboratory keep a copy, and follow the personal protection guidelines, of any material safety data sheet accompanying the receipt of a toxic material?		Y	
Sterilization Procedures	**4.1**		

ELEMENT			ITEM	Y/N/O	COMMENTS
Does the laboratory follow the minimum times for autoclaving the materials listed below at 121°C?			1.1.1		
- Membrane filters and pads	10 min			O	
- Carbohydrate containing media	12-15 min[1]			Y	
- Contaminated test materials	30 min[2]			Y	45 min @ 132°C
- Membrane filter assemblies	15 min			Y	
- Sample collection containers	15 min			Y	
- Individual glassware	15 min			Y	
- Dilution water blank	15 min			Y	
- Rinse water (0.5 - 1 L)	15-30 min[2]			Y	
[1] except where otherwise specified by the manufacturer					
[2] time depends upon water volume per container and autoclave load					
Are autoclaved membrane filters and pads and all media removed immediately after completion of the sterilization cycle?			4.1.2	Y	
Is membrane filter equipment autoclaved before the beginning of a filtration series?			4.1.3	Y	
If a UV light (254 nm) is used to sanitize equipment after initial autoclaving for sterilization, are all supplies presterilized?			4.1.4	O	
Sample Containers			4.2		
QC Is at least one sample container selected at random from each batch of sterile sample bottles, or other containers (or lot of commercially available sample containers), and the sterility confirmed by adding 25 mL of a sterile non-selective broth, incubating at 35°±0.5°C, and checking for growth after 24 and 48 hours?				Y	
QC Are these results recorded?				Y	
QC If growth is detected, is the entire batch resterilized?				Y	
Reagent-Grade Water			4.3		
Does the laboratory only use satisfactorily tested reagent water from stills or deionization units to prepare media, reagents, and dilution/rinse water for performing microbial analyses?			4.3.1	Y	
- Conductivity	>0.5 megohms resistance or <2 micromhos.cm (microsiemens/cm) at 25°C	Monthly*	4.3.2	Y	
- Pb, Cd, Cr, Cu, Ni, Zn	Not greater than 0.05 mg/L per contaminant. Collectively no greater than 0.1 mg/L	Annually		Y	
- Total chlorine residual*	<0.1 mg/L	Monthly		Y	
- Heterotrophic plate count*	<500/mL CFU/mL*	Monthly		Y	
- Bacteriological quality of reagent water*	Ratio of growth rate 0.8 to 3.0	Annually		O	
*See Section 4.3.2 for footnotes					
Dilution/Rinse Water			4.4		
Is stock buffer solution or peptone water prepared as specified in Standard Methods, Section 9050C?			4.4.1	O	
Are stock buffers autoclaved or filter-sterilized?			4.4.2	O	
Are these containers labeled, dated, and refrigerated?				O	
Are stored stock buffers free from turbidity?				O	
QC Is each batch (or lot, if commercially prepared) of dilution/rinse water checked for sterility by adding 50 mL of water to 50 mL double strength non-selective broth, incubating at 35°± 0.5°C, and checking for growth after 24 hours and 48 hours?			4.4.3	Y	
QC Are these results recorded?				Y	
QC Is the batch/lot discarded if growth is detected?				Y	
Glassware Washing			4.5		
Is distilled or deionized water used for the final rinse?			4.5.1	Y	
Is laboratory glassware washed with a detergent designed for laboratory use?			4.5.2	Y	

clrk conductivity
< 1 ?
Type II ?

are these in the right place?
Reloday w/ pH

ELEMENT	ITEM	Y/N/O	COMMENTS
QC Is the glassware inhibitory residue test performed before the initial use of a washing compound and whenever a different formulation, or washing procedure is used?	4.5.3	Y	Record?
QC Are these results recorded?		Y	
QC Is each batch of dry glassware used for microbial analysis spot-checked for pH reaction using 0.04% bromthymol blue (or equivalent pH indicator) and the color reaction recorded?	4.5.4	Y	
5. ANALYTICAL METHODOLOGY			
General	**5.1**		
For compliance samples, does the laboratory use only the analytical methodologies specified in the Total Coliform Rule (TCR), the Surface Water Treatment Rule (SWTR), and the Groundwater Rule (GWR)?	5.1.5	Y	
Is the laboratory certified for all analytical methods it uses for compliance purposes?	5.1.2	Y	
At a minimum, is the laboratory certified for one total coliform method and one fecal coliform or E. coli method?		Y	
Is the laboratory certified for a second total coliform method if one method cannot be used for some drinking waters?		Y	
For a laboratory that enumerates heterotrophic bacteria for compliance with the SWTR, is the laboratory certified for either the Pour Plate Method or the SimPlate method for heterotrophic bacteria?		Y	Do not perform for compliance
Are water samples shaken vigorously at least 25 times before analyzing?	5.1.3	y	
QC If dilution buffer is used, does the laboratory check the buffer volume in one dilution bottle of each batch or lot?	5.1.4	Y	
QC For a 90-mL or 99-mL volume, is the tolerance ±2 mL?		Y	
Does the laboratory analyze a 100-mL sample volume for total coliforms in drinking water?	5.1.5	Y	
Media (or defined substrate)	5.1.6		
Are dehydrated media stored in a cool dry location and discarded by the manufacturer's expiration date?	5.1.6.1	Y	
Is caked or discolored dehydrated media discarded?		Y	
QC For media prepared in the laboratory is the following information recorded?	5.1.6.2		
- Date of preparation		Y	
- Type of medium		Y	
- Lot number		Y	
- Sterilization time and temperature		Y	
- Final pH (after sterilization)		Y	
- Technician's initials		Y	
QC For media prepared commercially is the following recorded for each lot?	5.1.6.3		
- Date received		Y	
- Type of medium		Y	
- Lot number		Y	
- pH verification		Y	
QC Are media prepared commercially discarded by manufacturer's expiration date?		Y	
QC Is each new lot of dehydrated or prepared commercial medium and each batch of laboratory-prepared medium checked before use for sterility and with positive and negative culture controls?	5.1.6.4	Y	
QC Are these results recorded?		Y	
QC For laboratories using commercially prepared media with manufacturer shelf-lives of greater than 90 days, are positive and negative controls run each quarter, in addition to that noted above?		Y	
QC Are these results recorded?		Y	
QC For control organisms, are stock cultures periodically checked for purity and the results recorded, or are commercially available disks impregnated with the organism used?		Y	
If prepared medium is stored after sterilization, is it maintained in the dark as follows?	5.1.6.5		
- poured plates 1° - 5°C 2 weeks		Y	

ELEMENT			ITEM	Y/N/O	COMMENTS
- broth in containers with loose-fitting closures	1° - 30°C	2 weeks		Y	
- broth in tightly closed containers	1° - 30°C	3 months		Y	
QC Does the laboratory perform parallel testing between a newly approved test and another EPA-approved procedure for enumerating total coliforms for at least several months and/or several seasons to assess the effectiveness of the new test for the wide variety of water types submitted for analysis? Recommended.			5.1.7	Y	
Does the laboratory perform the approved methods listed in this section for the TCR, SWTR, and/or GWR?			5.1.8	Y	
Fermentation broth methods			**5.2**		
General			5.2.1		
Is the water level of the water bath above the upper level of the medium in the culture tubes?			5.2.1.1	Y	
If a Dri-bath incubator is used, is the specified temperature requirement maintained in all tube locations used?			5.2.1.2	O	
Multiple Tube Fermentation Technique (for detecting total coliforms in drinking water and enumerating total coliforms in source water)			5.2.2		
For drinking water samples, is the total sample volume of 100 mL used for each test?			5.2.2.1	Y	
For source water samples, are at least 3 series of five tubes each with appropriate sample dilutions used?			5.2.2.2	O	
Media			5.2.2.3		
Is lauryl tryptose broth (LTB) used in the presumptive test and 2% brilliant green lactose bile broth (BGLBB) in the confirmed test?			5.2.2.3.1	Y	
If lactose broth (LB) is used in lieu of LTB, has the laboratory conducted at least 25 parallel tests between this medium and LTB using the waters normally tested?				O	
Has this comparison demonstrated that the false-positive rate and false-negative rate for total coliforms, using LB, is less than 10%?				O	
Is this comparison information documented and the records retained?				O	
Is the final pH of LTB medium 6.8 ± 0.2?				Y	
Is the final pH of 2% BGLBB 7.2 ± 0.2?				Y	
Is the test medium concentration adjusted to compensate for the sample volume so that the resulting medium after sample addition is single strength?			5.2.2.3.2	Y	
If a single 100-mL sample volume is used, is the inverted vial replaced with an acid indicator (bromcresol purple)?				Y	
Is the medium autoclaved at 121°C for 12-15 minutes?				Y	
Is the sterile medium in tubes examined to ensure that the inverted vials, if used, are free of air bubbles and are at least one-half to two-thirds covered after the water sample is added?			5.2.2.3.3	Y	
Is the inoculated medium incubated at 35°±0.5°C for 24±2 hours?			5.2.2.4	Y	
If no gas or acid detected, is the inoculated medium incubated for another 24 hours for a total incubation time of 48±3 hours?				Y	
Is each 24- and 48-hour tube that has growth or is gas-positive or acid-positive confirmed using 2% BGLBB?			5.2.2.5	Y	
For drinking water samples, is each total coliform-positive sample tested for the presence of either fecal coliforms or E. coli?			5.2.2.6	Y	
Invalidation of total coliform-negative samples			5.2.2.7		
For drinking water samples, are all samples that produce a turbid culture (i.e., heavy growth) in the absence of gas/acid production, in LTB or LB, invalidated?			5.2.2.7.1	Y	
Does the laboratory then collect, or request that the system collect, another sample within 24 hours from the same location as the original invalidated sample?				Y	
Although not required before invalidation, does the laboratory perform a confirmed test and/or a fecal coliform/E. coli test on the total coliform-negative culture to check for coliform suppression?				Y	
And if the confirmed test is total coliform-positive or fecal coliform/E. coli-positive, does the laboratory report the sample as such?				Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
If the follow-up test is total coliform-negative, does the laboratory invalidate the sample?		Y	
For source water samples, are all samples that produce a turbid culture (i.e., heavy growth) in the absence of gas/acid production in LTB or LB invalidated?	5.2.2.7.2	O	
Does the laboratory collect, or request that the system collect, another sample from the same location as the original invalidated sample?		O	
Although not required before invalidation, does the laboratory perform a confirmed test on the total coliform-negative culture and, if the confirmed test is total coliform-positive, is the MPN reported?		O	
If the confirmed test is total coliform-negative, is the sample invalidated?		O	
Presence-Absence (P-A) Coliform Test (for detecting total coliforms in drinking water)	5.2.3		
Medium	5.2.3.1		
When six-times formulation strength medium is used, is it filter-sterilized rather than autoclaved?	5.2.3.1.1	O	
Is the medium autoclaved for 12 minutes at 121°C?	5.2.3.1.2	O	
Is the total time in the autoclave less than 30 minutes?		O	
Are the bottles placed in the autoclave with space between them?		O	
Is the final pH of the medium 6.8±0.2?		O	
If the prepared medium is stored, is it maintained in a culture bottle at 1E-30°C in the dark for no more than 3 months?	5.2.3.1.3	O	
Is the stored medium discarded if evaporation exceeds 10% of original volume?		O	
Is a 100-mL sample inoculated into a P-A culture bottle?	5.2.3.2	O	
Is the sample/medium incubated at 35°±0.5°C and observed for yellow color (acid) after 24 and 48 hours?	5.2.3.3	O	
Are yellow cultures confirmed in BGLBB and a fecal coliform/E. coli test conducted?	5.2.3.4	O	
Are all samples which produce a non-yellow turbid culture in P-A medium invalidated?	5.2.3.5	O	
Does the laboratory collect, or request that the system collect, another sample from the same location as the original invalidated sample?		O	
Although not required before invalidation, does the laboratory perform a confirmed test on the total coliform-negative culture and/or a fecal coliform/E. coli test and, if the confirmed test is total coliform-positive, is the sample reported as such?		O	
If the confirmed test is total coliform-negative, is the sample invalidated?		O	
Fecal Coliform Test (using EC Medium for fecal coliforms in drinking or source water, or A-1 Medium for fecal coliforms in source water only)	5.2.4	Y	
EC Medium	5.2.4.1		
Is EC medium used to test a total coliform-positive culture for fecal coliforms under the Total Coliform Rule?	5.2.4.1.1	Y	
Is each total coliform-positive culture transferred from a presumptive tube/bottle, or each presumptive total coliform-positive colony (unless a cotton swab is used), to at least one tube containing EC Medium with an inverted vial?		Y	
Is EC medium used to enumerate fecal coliforms in source water, in accordance with the SWTR?	5.2.4.1.2	O	
When conducting a MTF test, are three sample volumes of source water with five or ten tubes/sample volume used?		O	
Is a culture from each total coliform-positive tube transferred to a tube containing EC Medium with an inverted vial?		O	
Is EC Medium autoclaved at 121°C for 12-15 minutes?	5.2.4.1.3	Y	
Is the final pH of EC medium 6.9±0.2?		Y	
Are the inverted vials examined to ensure that they are free of air bubbles and at least one-half to two-thirds covered after the sample is added?	5.2.4.1.4	Y	
Is EC Medium incubated at 44.5°±0.2°C for 24±2 hours?	5.2.4.1.5	Y	
Is any amount of gas detected in the inverted vial of a tube that has turbid growth considered a fecal coliform-positive test, regardless of the result of any subsequent test on that culture?	5.2.4.1.6	Y	
A-1 Medium	5.2.4.2		

ELEMENT	ITEM	Y/N/O	COMMENTS
If A-1 Medium is used, is it used to enumerate only fecal coliforms in source water, in accordance with SWTR, and not for drinking water samples?	5.2.4.2.1	O	A1 Medium
Are three sample volumes of source water used in a five- or ten-tube/sample volume format?		O	
Is A-1 Medium autoclaved at 121°C for 10 minutes?	5.2.4.2.2	O	
For A-1 Medium, is the final pH 6.9±0.1?		O	
Are inverted tubes examined to ensure that they are free of air bubbles?	5.2.4.2.3	O	
Is A-1 Medium incubated at 35°±0.5°C for three hours, and then incubated at 44.5°±0.2 °C for 21±2 hours?	5.2.4.2.4	O	
Are loose-cap tubes stored in the dark at room temperature for no longer than two weeks, or in tightly closed screw-cap tubes in the dark at <30°C for no longer than three months?	5.2.4.2.5	O	
Is any amount of gas detected in the inverted vial of a tube with turbid growth considered a fecal coliform-positive test?	5.2.4.3	O	
Azide dextrose medium (for detecting fecal streptococci in ground water)	5.2.5	O	
For testing 100-mL samples, is triple strength (3X) formulation in a culture bottle prepared and then autoclaved at 121°C for 15 minutes?	5.2.5.1	O	
Is medium final pH 7.2±0.2?		O	
Is a 100-mL water sample added to the sterilized medium and incubated at 35°±0.5°C?	5.2.5.2	O	
Is the culture checked for turbidity after 24±2 hours?	5.2.5.3	O	
If turbidity is not observed, is the culture reincubated and checked again after a total incubation period of 48±3 hours?		O	
Are turbid cultures confirmed as fecal streptococci by streaking a portion of the broth onto bile esculin agar (BEA) or bile esculin azide agar (BEAA)?	5.2.5.4	O	
Are BEA and BEAA autoclaved at 121°C for 15 minutes?	5.2.5.5	O	
Is the final pH 6.6±0.2 for BEA and 7.1±0.2 for BEAA?		O	
After streaking, are plates incubated at 35°±0.5°C for 48 hours?	5.2.5.6	O	
Are the brownish-black colonies with brown halos on BEA or BEAA used as confirming the presence of fecal streptococci?	5.2.5.7	O	
If required, does the laboratory perform an enterococci test by transferring one or more fecal streptococci colonies to brain heart infusion broth supplemented with 6.5% NaCl and incubating the culture at 35°±0.5C for 48 hrs?		O	
Enzyme (chromogenic/fluorogenic) substrate tests	**5.3**		
General	5.3.1		
For detecting total coliforms and E. coli in drinking water by an enzyme substrate test, does the laboratory use one of the following: MMO-MUG test (Colilert), Colisure test, E*Colite test, Readycult Coliforms 100 Presence/Absence Test, Fluorocult LMX test, or Colitag test?	5.3.1.1	Y	
For enumerating total coliforms in source waters by an enzyme substrate test, does the laboratory use the Colilert test?		Y	
If a laboratory uses a fermentation method to detect total coliforms in drinking water, and the sample is total coliform-positive, does the laboratory transfer the positive culture to the EC+MUG test to detect E. coli, but not to any other enzyme substrate test medium in Section 5.3?		O	Should be N ?
Media	5.3.1.2		
Does the laboratory purchase media from a commercially available source only, and not prepare media from basic ingredients?	5.3.1.2.1	Y	
Are media kept protected from light?	5.3.1.2.2	Y	
Is each lot of medium checked for fluorescence before use with a 365-366-nm ultraviolet light with a six watt bulb?	5.3.1.2.3	Y	
If medium exhibits faint fluorescence, is another lot used that does not fluoresce?		Y	
If samples plus medium exhibit color changes before incubation, is the medium discarded and another lot of medium used?	5.3.1.2.4	Y	
Are glass and plastic bottles and test tubes checked before use with a 365-366-nm ultraviolet light source with a 6-watt bulb to ensure that they do not fluoresce?	5.3.1.3	Y	
If they fluoresce, does the laboratory use another lot of containers that does not fluoresce?		Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
If a Whirl-Pak7 bag is used to incubate the Colilert or Colitag medium or any other medium which changes to a yellow color to indicate a positive result, is a type used that has a barrier (e.g., B01417) to prevent gaseous emissions to other Whirl-Pak7 bags during incubation?	5.3.1.4	O	
QC If a small air-type incubator is used, are samples brought to room temperature before incubation?	5.3.1.5	O	
If a water bath is used, is the water level above the upper level of the medium?	5.3.1.6	Y	
For E. coli testing, are all total coliform-positive samples placed under a UV lamp (365-366 nm) in a darkened area?	5.3.1.7	Y	
Does the laboratory refrain from using the enzyme substrate test to confirm a presumptive total coliform-positive culture in a fermentation broth or on a membrane filter?	5.3.1.8	O	Why not Y?
Does the laboratory invalidate any sample that produces an atypical color change (in the absence of a yellow color) and then collect, or request that the system collect, another sample from the same location as the original invalidated sample?	5.3.1.9	Y	check is the 2nd method.
Does the laboratory use another method to test the second sample?		Y	
Is the reference comparator provided by the manufacturer discarded by the manufacturer's expiration date?	5.3.1.10	Y	
Criteria for specific media	5.3.2		
For the Colilert test, are samples incubated at 35°±0.5°C for 24 hours?	5.3.2.1	Y	
Is a sample with a yellow color in the medium equal to or greater than reference comparator recorded as total coliform-positive?		Y	
Is a sample with a yellow color lighter than comparator incubated for another four hours but no longer than 28 hours total?		Y	documented?
Is a sample with a yellow color lighter than the comparator after 28 hours of incubation recorded as total coliform-negative?		Y	
Are coliform-positive samples that fluoresce under a UV light marked as E. coli-positive?		Y	
For the Colilert-18 test, are samples incubated for 18 hours (up to 22 hours if the sample after 18 hours is yellow, but lighter than the comparator)?		Y	
For enumerating total coliforms in source waters, does the laboratory use the Colilert test, a 5- or 10-tube configuration, Quanti-Tray, or Quanti-Tray 2000 for each sample dilution tested?	5.3.2.1.1	Y	
When dilution water is used, is it either sterile deionized or sterile distilled water, not buffered water?		Y	
QC If the Quanti-Tray or Quanti-Tray 2000 test is used, is the sealer checked monthly by adding a dye to the water?	5.3.2.1.2	Y	documented?
For the Colisure test, are samples incubated at 35°±0.5°C for 24-48 hours?	5.3.2.2	O	
If the medium changes from a yellow color to a red/magenta color, is the sample noted as total coliform-positive?		O	
Is a coliform-positive sample that fluoresces under a UV light marked as E. coli-positive?		O	
For the E*Colite test, is the sample incubated at 35°±0.5°C for 28 hours?	5.3.2.3	O	
If the medium changes from a yellow color to a blue or blue-green color, or a blue color in the corners of the bag, is the sample marked as total coliform-positive?		O	
If the medium fluoresces under a UV light, is the sample considered as E. coli-positive?		O	
If fluorescence is not observed, is the sample reincubated for an additional 20 hours (for a total incubation time of 48 hours) and checked again for fluorescence?		O	
If the medium becomes red in color, is the sample discarded and another sample requested?		O	
For the Readycult Coliforms 100 Presence-Absence test, are the contents of a snap pack added to a 100-mL sample and then incubated at 35°±0.5°C for 24±1 hours?	5.3.2.4	O	
If the medium changes color from a slightly yellow color to blue-green, is the sample marked as coliform-positive?		O	
If the medium fluoresces a bright light-blue color when subjected to long wave UV (365-366 nm) light, is the sample marked as E. coli-positive?		O	

ELEMENT	ITEM	Y/N/O	COMMENTS
For the Fluorocult LMX test, is the medium added to purified water, mixed, and the mixture then boiled to dissolve the medium completely in the water?	5.3.2.5	O	
Are 100-mL aliquots transferred to 250-mL bottles and then autoclaved for 15 minutes?		O	
Are the autoclaved bottles cooled before adding the 100-mL water sample?		O	
Is the E. coli/Coliform Supplement not added to the medium?		O	
Is the sample then incubated at 35°±0.5°C for 24±1 hours?		O	
If the medium changes color from a slightly yellow color to blue-green, is the sample marked as coliform-positive?		O	
If the medium fluoresces a bright light-blue color when subjected to long wave UV (365-366 nm) light, is the sample marked as E. coli-positive?		O	
For the Colitag test, are samples incubated at 35°±0.5°C for 24±2 hours?	5.3.2.6	O	
If the medium changes to a yellow color, is the sample marked as coliform-positive?		O	
If the medium fluoresces under a UV light, is the sample marked as E. coli-positive?		O	
EC Medium + MUG (for detection of E. coli)	5.3.3		
If EC medium + MUG is used, is a total coliform-positive culture transferred from a presumptive tube/bottle or colony to this medium?	5.3.3.1	O	
Is the final pH of EC medium + MUG 6.9±0.2?	5.3.3.2	O	
Is the medium plus sample incubated at 44.5°±0.2°C for 24±2 hours and then tested for fluorescence?	5.3.3.4	O	
Enterolert test (for detection of enterococci in ground water)	5.3.4	O	
Is the medium stored in the dark at 4°-30°C until used?	5.3.4.1	O	
Is Enterolert reagent added to a 100-mL sample and the sample/medium incubated at 41°±0.5°C for 24-28 hours?	5.3.4.2	O	
Is fluorescence under a UV lamp used to indicate the presence of enterococci?		O	
Membrane Filter (MF) methods	**5.4**		
General	5.4.1		
For source water samples (SWTR), do dilutions yield 20 to 80 total coliform colonies or 20 to 60 fecal coliforms for at least one dilution or volume?	5.4.1.1	Y	
QC Is at least one membrane filter and filtration unit sterility check conducted at the beginning and the end of each filtration series by filtering 20-30 mL of dilution water through the membrane filter and testing for growth?	5.4.1.2	Y	
QC If the control indicates contamination, does the laboratory reject all data from affected samples and request an immediate resampling?		Y	
QC Does the laboratory consider a filtration series as ended when 30 minutes or more has elapsed between sample filtrations?		Y	
Are filtration funnels rinsed after each sample filtration with two or three 20-30 mL portions of sterile rinse water to ensure that the entire sample is rinsed off the funnel onto the filter?	5.4.1.3	Y	
Are absorbent pads saturated with at least 2 mL of broth and the excess medium removed by Adecanting@ the plate?	5.4.1.4	O	
MF method for detecting total coliforms and E. coli in drinking water, enumerating total coliforms or fecal coliforms in source water, and detecting E. coli in ground water	5.4.2	Y	
Media for total coliforms, fecal coliforms, and E. coli	5.4.2.1	Y	
If either M-Endo agar or broth or M-Endo agar LES is used to detect total coliforms in drinking water or enumerating total coliforms in source water, is either the single step or the enrichment technique used?	5.4.2.1.1	Y	
Is denatured ethanol used in the rehydration procedure?		Y	
Is the medium prepared in a sterile flask?		Y	
Is a boiling water bath or a constantly attended hot plate with a stir bar used to bring the medium just to the boiling point but not boiled?		Y	
Is the final for M-Endo medium pH 7.2±0.1 and the final pH for M-Endo agar LES 7.2±0.2?		Y	
Is M-Endo medium or M-Endo agar LES incubated at 35E±0.5EC for 22-24 hrs?	5.4.2.2	Y	
Are colonies with a metallic (golden) sheen recorded as presumptive total coliforms?	5.4.2.2	Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
If m-ColiBlue24 medium is used to detect total coliforms and E. coli in drinking water, are the ampules of broth inverted 2-3 times to mix contents before breaking and the contents then poured evenly over an absorbent pad?	5.4.2.1.2	O	
Are unopened refrigerated ampules stored in the dark?		O	
Are unopened ampules discarded before the expiration date, or earlier if contamination is observed?		O	
Is the medium final pH 7.0±0.2?		O	
Is m-ColiBlue24 incubated at 35E±0.5EC for 24 hrs?	5.4.2.1.3	O	
Are red colonies recorded as total coliforms, and blue to purple colonies recorded as E. coli?		O	
If MI medium (with or without agar) is used to detect total coliforms and E. coli in drinking water or enumerate total coliforms in source water, is commercially prepared presterilized bottled MI agar or broth not autoclaved?		O	
Is this presterilaized bottled agar medium melted in a boiling water bath (or by other processes recommended by the manufacturer), and care taken not to overheat the agar?		O	
Is the medium then cooled slightly and poured immediately into sterile plates?		O	
If dehydrated culture medium is used, is it prepared and autoclaved according to manufacturer's instructions?		O	
Is this agar medium cooled before adding freshly prepared, filter- sterilized cefsulodin, and then poured immediately into sterile plates?		O	
Is the final pH of MI agar 6.95±0.20 and the final pH of MI broth 7.05±0.20?		O	
Is MI medium incubated at 35E±0.5EC for 24±2 hrs?	5.4.2.2	O	
Are fluorescent colonies under UV light recorded as total coliforms, and blue colonies under normal light recorded as E. coli?	5.4.2.2	O	
If Chromocult7 Coliform Agar is used to detect total coliforms and E. coli in drinking water, is the agar medium autoclaved or overheated?	5.4.2.1.4	O	
Is the final pH of this medium 6.8±0.2?		O	
If a heavy background of heterotrophic bacteria is expected, is cefsulodin solution added to 1L of cooled (45°-50°C) medium as a solution of 10 mg cefsulodin dissolved in 2-mL deionized or distilled water?		O	
Is Chromocult incubated at 36E±1EC for 24±1 hrs?	5.4.2.2	O	
Are salmon to red colonies recorded as total coliforms, and dark-blue to violet colonies recorded as E. coli?	5.4.2.2	O	
If Coliscan7 is used to detect total coliforms and E. coli in drinking water or enumerate total coliforms in source water, is the manufacturer's protocol for reconstitution and antibiotic addition followed?	5.4.2.1.5	O	
Is the antibiotic, cefsulodin, overheated?		O	
Is the final pH of Coliscan agar 7.00±0.20?		O	
Is Coliscan incubated at 32E-37EC for 24-28 hrs?	5.4.2.2	O	
Are pink-magenta colonies recorded as total coliforms, and purple-blue colonies recorded as E. coli?	5.4.2.2	O	
If m-FC broth, with or without agar, is used to enumerate fecal coliforms in source water, is the medium autoclaved?	5.4.2.1.6	O	
Is m-FC broth just brought to the boiling point?		O	
Is the final pH of m-FC medium 7.4±0.2?		O	
Is m-FC broth incubated at 44.5E±0.2EC for 24±2 hrs?	5.4.2.2	O	
Are blue colonies recorded as fecal coliforms?	5.4.2.2	O	
Is the prepared medium refrigerated when stored and brought to room temperature before use?	5.4.2.1.7	O	
Are petri dishes containing medium stored in a plastic bag or tightly closed container, and used within 2 weeks?		Y	
Are plates with laboratory-prepared broth medium discarded after 96 hours, poured agar plates after 2 weeks, and ampuled broth discarded before the manufacturer's expiration date?		Y	
Are the date and time of medium preparation recorded?		Y	
For invalidation of a total coliform-negative drinking water sample, are all samples resulting in confluent growth or TNTC growth invalidated unless at least one total coliform colony is detected?	5.4.2.3	Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
If no coliforms are detected, is the sample recorded as Aconfluent growth@ or ATNTC@ and an additional sample requested from the same sampling site?		Y	
Does the laboratory perform a verification test on the total coliform-negative culture before invalidation?		Y	
If the verification test is total coliform-positive, does the laboratory report the sample as total coliform-positive?		Y	
If the verification test is total coliform-negative, is the sample invalidated?		Y	
For invalidation of source water samples (SWTR), where coliform density must be determined, does the laboratory invalidate any sample that results in confluent growth or TNTC, even when total coliform or fecal coliform colonies are present?	5.4.2.4	Y	
For drinking water samples on M-Endo type media, are all sheen colonies, up to a maximum of five, verified by using either LB or LTB and then 2% BGLBB or, alternatively, by using a cytochrome oxidase and β-galactosidase procedure?	5.4.2.5	Y	
If no sheen colonies are observed, are up to five red questionable sheen colonies and/or red non-sheen colonies representing different morphological types verified?		Y	
For drinking water samples, are total coliform-positive colonies tested for E. coli or fecal coliforms?	5.4.2.6	Y	
When EC Medium or EC + MUG is used, are colonies transferred by employing one of the options specified by the Total Coliform Rule?		Y	
When the swab technique is used, is a single swab used to inoculate a presumptive total coliform-positive sample into EC or EC+MUG first, LTB second, and BGLBB third?		Y	
For source water samples, are the initial total coliform counts adjusted based upon verified data?	5.4.2.7	Y	
QC For source water samples when two or more analysts are available, does each analyst count the total coliform or fecal coliform colonies on the same membrane monthly and do the counts agree within 10%?	5.4.2.8	Y	
Nutrient Agar + MUG Test (for detection of E. coli in drinking water or ground water)	5.4.3		
Is the medium autoclaved at 121°C for 15 minutes?	5.4.3.1	O	
Is the final MUG concentration 100 μg/L?		O	
Is the final pH of NA + MUG 6.8±0.2?		O	
QC Are positive and negative culture controls tested as stated in 5.1.6.4?	5.4.3.2	O	
QC Are culture controls filtered or spot-inoculated onto a membrane filter on M-Endo broth or agar, or M-Endo agar LES, and incubated at 35°±0.5°C for 24 hours?		O	
QC Is the filter then transferred to NA + MUG and incubated at 35°±0.5°C for another four hours?		O	
QC Are these results read and recorded?		O	
Is the membrane filter containing total coliform colonies transferred to the surface of the Nutrient Agar + MUG medium?	5.4.3.3	O	
Is the presence of each sheen colony marked on the petri dish lid with permanent marker, and the lid and base marked to realign the lid when removed?		O	
For the total coliform verification test, is a portion of each colony transferred with needle before the MF transfer or after the four-hour NA + MUG incubation time?		O	
Alternatively, is the membrane filter surface swabbed with a sterile cotton swab after the four-hour incubation time on NA + MUG and then transferred to a total coliform verification test?		O	
Is the inoculated NA + MUG medium incubated at 35°±0.5°C for four hours?	5.4.3.4	O	
Is fluorescence checked by using a UV lamp (365-366 nm) with a six-watt bulb in a darkened room and any fluorescence in the halo around a sheen colony considered positive for E. coli?	5.4.3.5	O	
MF method for detecting enterococci/fecal streptococci in ground water	5.4.4	O	
Media	5.4.4.1		

ELEMENT	ITEM	Y/N/O	COMMENTS
When mE agar is used for the detection of enterococci, is basal mE agar prepared, autoclaved, and cooled before the addition of nalidixic acid (or its sodium salt) and triphenyl tetrazolium chloride, both of which are added separately to the medium and mixed?	5.4.4.1.1	O	
Is the final pH of mE agar 7.1±0.2?		O	
When m-Enterococcus agar is used for the detection of fecal streptococci (not enterococci), is the medium heated, not autoclaved, to dissolve the ingredients?	5.4.4.1.2	O	
Is the final pH of m-Enterococcus agar 7.2±0.2?		O	
When mEI agar is used for the detection of enterococci, is 0.75g indoxyl-β-D-glucoside added to 1L basal mE agar and then prepared according to 5.4.4.1.1 except that only 0.02 g/L triphenyl tetrazolium chloride is added?	5.4.4.1.3	O	
Is the final pH of mEI agar 7.1±0.2?		O	
Is a 100-mL sample filtered and the membrane placed on one of the agar media previously listed?	5.4.4.2	O	
If m-Enterococcus agar is used, are the plates incubated in an inverted position at 35°±0.5°C for 48 hours?	5.4.4.3	O	
Using magnification and a fluorescent lamp, are all light and dark red colonies counted as fecal streptococci?		O	
If mE agar is used, are the plates incubated in an inverted position for 48 hours at 41°±0.5°C?	5.4.4.4	O	
Is the membrane filter then transferred to EIA medium and incubated at 41°±0.5°C for 20-30 minutes?		O	
Using magnification and a fluorescent lamp, are all pink to red colonies on mE agar with a black or reddish brown precipitate on the underside of the filter on EIA agar counted as enterococci?		O	
If mEI agar is used, are plates incubated in an inverted position for 24 hours at 41°±0.5°C?	5.4.4.5	O	
Using magnification and a fluorescent lamp, is the plate examined, top and bottom, for colonies with a blue halo, and any colony with a blue halo (regardless of colony color) considered as positive for enterococci?		O	
Heterotrophic Plate Count (for enumerating heterotrophic bacteria in drinking water)	**5.5**		
Does the laboratory use the Pour Plate Method or the SimPlate Method for enumerating heterotrophic bacteria in drinking water and for testing reagent grade water?	5.5.1	Y	
For systems granted a variance from the TCR's maximum contaminant level, does the laboratory use R2A medium with a method in Standard Methods, Section 9215 for enumerating heterotrophic bacteria in drinking water?		O	
Media	5.5.2		
Is the final pH recorded for plate count agar pH 7.0±0.2, R2A agar 7.2±0.2, and SimPlate 7.2±0.2?		Y	
For the Pour Plate Method, is melted agar tempered at 44°-46°C in a water bath and maintained no more than 3 hours before pouring?	5.5.3	Y	
Is this sterile medium melted only once?		Y	
For the Spread Plate Method, is 15 mL of R2A medium (or other medium) poured into a sterile petri dish and allowed to solidify?	5.5.4	O	
Is refrigerated medium in bottles or screw-capped tubes stored for no longer than six months, or in petri dishes for no longer than 2 weeks (one week for prepared petri dishes with R2A medium)?	5.5.5	Y	
For countable plates of most potable water samples, are 1.0 mL and/or 0.1 mL volumes of the undiluted sample plated?	5.5.6	Y	
Are at least duplicate plates prepared per dilution tested?		Y	
For the Pour Plate Method, is the sample pipetted aseptically onto the bottom of a sterile petri dish and then at least 10-12 mL tempered melted agar added?	5.5.7	Y	
Is the sample and melted agar mixed, avoiding spillage?		Y	
After the agar plates have solidified on a level surface, are they inverted and incubated at 35°±0.5°C for 48±3 hours?		Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
Are plates stacked no more than four high and arranged in the incubator to allow proper air circulation and to maintain a uniform incubation temperature?		Y	
Does the laboratory ensure that incubator does not have excess humidity and that the plates do not lose more than 15% by weight during the 48 hours of incubation?		Y	
For the Spread Plate Method, is 0.1 or 0.5 mL of the sample (or dilution) pipetted onto the surface of the predried agar in the plate and then spread over the entire surface using a sterile bent glass rod?	5.5.8	O	
Is the inoculum absorbed completely before incubating?		O	
Are the plates incubated in an inverted position at 20°-28°C for 5-7 days?		O	
For the Membrane Filter Technique, does the filtered volume yield between 20-200 colonies?	5.5.9	O	
Is the filter transferred to a petri dish containing 5 mL solidified R2A medium and then incubated at 20°-28°C for 5-7 days?		O	
Are plates with loose-fitting lids placed in a plastic box with a close-fitting lid and moistened paper towels, and rewetted as necessary?		O	
Are colonies counted using a stereoscopic microscope at 10-15X magnification?		O	
SimPlate Method	5.5.10		
For a single sample Unit Dose, is a 10-mL test sample added to a test tube containing dehydrated SimPlate medium and then poured onto the center of a plate containing 84 small wells?	5.5.10.1	O	
Alternatively, is 9-mL of sterile diluent added to the test tube containing the dehydrated medium, followed by a 1-mL sample, and the medium plus sample then poured onto the center of a plate containing 84 small wells?		O	
Is this mixture distributed evenly to the 84 wells and is the excess liquid drained into the absorbent pad on the plate?		O	
Is the plate inverted and incubated at 35°±0.5°C for 45-72 hours?		O	
Is bacterial density determined by counting the number of wells that fluoresce under a 365-366-nm UV light, and converting this value to a Most Probable Number/mL using the manufacturer's Unit Dose MPN table?		O	
If a 10-mL sample is used, is the Unit Dose MPN/mL read directly or, if a 1-mL sample is used, is the MPN/mL value corrected by multiplying it by 10?		O	
For the Multiple Dose for 10 samples of 1 mL each, is a 100-mL sterile diluent added to the dehydrated SimPlate medium and shaken to dissolve?	5.5.10.2	O	
Is a 1.0-mL test sample then pipetted to the center of a plate, followed by 9 mL of the reconstituted medium?		O	
Is the plate then gently swirled to mix and distribute the sample and medium mixture evenly to the 84 wells, with the excess liquid then being drained into the absorbent pad on the plate?		O	
Is the plate inverted and incubated at 35°±0.5°C for 45-72 hours?		O	
Is bacterial density determined by counting the number of wells that fluoresce under a 365-366-nm UV light, and converting this value to a Most Probable Number/mL using the manufacturer's Multi-Dose MPN table?		O	
If sample dilutions were made during sample preparation, is the MPN/mL value multiplied by the dilution factor?		O	
For the Pour Plate and Spread Plate Techniques, are colonies counted manually using a dark field colony counter?	5.5.11	Y	QC pre & post plates?
Are only plates having 30 to 300 colonies counted, except for plates inoculated with 1.0 mL of undiluted sample where counts of less than 30 are acceptable?		Y	
QC Is each batch or flask of agar checked for sterility by pouring a final control plate?	5.5.12	Y	
QC Does the laboratory reject data if the control is contaminated?		Y	
6. SAMPLE COLLECTION, HANDLING, AND PRESERVATION			
Sample Collector	**6.1**		
Is the sample collector trained in aseptic sampling procedures and, if required, approved by the appropriate regulatory authority or its designated representative?		Y	
Sampling	**6.2**		

ELEMENT	ITEM	Y/N/O	COMMENTS
Are the drinking water samples collected under the Total Coliform Rule representative of the water distribution system?	6.2.1	Y	
Are the water taps used for sampling free of aerators, strainers, hose attachments, mixing type faucets, and purification devices?		Y	
Are only cold water taps used?		Y	
Are service lines cleared before sampling by maintaining a steady water flow for at least 2 minutes or until a steady water temperature is reached?		Y	
Is at least a 100-mL sample volume collected, allowing at least a 1-inch air space in the container to facilitate mixing of the sample by shaking?		Y	
Is a sample information form completed immediately after sample collection?		Y	
If a sample bottle is filled too full to allow for proper mixing, is the entire sample poured into a larger sterile container and mixed before proceeding with the analysis?		Y	
For the SWTR, are the source water samples representative of the source of supply and collected not too far from the intake point, but at a reasonable distance from the bank or shore?	6.2.2	Y	
Is the sample volume sufficient to perform all the tests required?		Y	
For the analysis of coliphage, E. coli, or enterococci under the GWR, is at least a 100-mL sample volume collected?	6.2.3 6.2.4	Y	
Sample Icing	**6.3**		
For drinking water bacterial samples, is the sampler encouraged to hold samples at <10°C during transit to the laboratory?	6.3.1	O	AZ - given directions to do so. "N" ? = problem
For source water bacterial samples, are samples held at <10°C during transit to the laboratory?		O	
Does the laboratory reject samples that have been frozen?		O	
For coliphage analysis under the GWR, are samples shipped at <10°C, stored at 1°-5°C, and not frozen?	6.3.2	O	No temp blank?
QC For SWTR samples and coliphage samples, does the laboratory record sample temperature upon receipt?		O	
QC Does the laboratory flag samples that have a temperature upon receipt of >10°C, whether iced or not, unless the time since the sample collection is less than two hours?		O	
Sample Holding/Travel Time	**6.4**		
For the analysis of total coliforms in drinking water, does the time between sample collection and placement of the sample in the incubator not exceed 30 hours?	6.4.1	Y	30 hrs
Are all samples analyzed on the day of receipt?		Y	
Are samples received late in the day refrigerated overnight only if analysis can begin within 30 hours of collection?		Y	
For total coliforms and fecal coliforms in surface water sources, and for heterotrophic bacteria in drinking water, is the time from sample collection to placement in the incubator less than eight hours?	6.4.2	Y	8 hrs.
For coliphage analysis, is the time from sample collection to placement of sample in the incubator less than 48 hours?	6.4.3	O	
For coliphage analysis, is the time from sewage sample collection to analysis of QC spiking suspension less than 24 hours, unless re-titered and the titer has not decreased by more than 50%?		O	
If the titer has not decreased by more than 50%, is the sample stored no longer than 72 hours?		O	
For E. coli and enterococci analysis under the GWR, is the time between sample collection and the placement of sample in the incubator less than 30 hours?	6.4.4	Y	
Sample Information Form	**6.5**		
After collection, does the sampler enter the following information, in indelible ink, on sample information form?			
- Name of system (PWSS identification number if available)		Y	) chk all.
- Sample identification (if any)		Y	
- Sample site location		Y	
- Sample type (e.g., a routine distribution, repeat, raw or process, or other special purpose)		Y	
- Date and time of collection		Y	

ELEMENT	ITEM	Y/N/O	COMMENTS
- Analysis requested		Y	chk!
- Disinfectant residual		Y	
- Name of sampler		Y	
Any remarks			
Chain-of-Custody	6.6		
Are applicable State regulations pertaining to chain-of-custody followed by sample collectors and the laboratory?		Y	
7. QUALITY ASSURANCE			
Does the laboratory have a written QA Plan prepared and available for inspection?	7.1	Y	chk!
Does the laboratory follow the written QA Plan?		Y	
Does the laboratory have a Standard Operating Procedure available for review pertaining to its own calibration of equipment or supplies?		Y	
Does the laboratory successfully analyze at least one set of PT samples once every 12 months for each method for which it is certified?	7.2	Y	
For methods used to test the presence or absence of an organism in a sample, does the laboratory analyze each PT sample set using a single analytical method only?		Y	
8. RECORDS AND DATA REPORTING			
Legal Defensibility	8.1		
Are compliance monitoring data being maintained by the laboratory both thorough and accurate, and thus legally defensible?		Y	
Does the laboratory's QA plan and/or SOPs describe the policies and procedures used by the facility for record retention and storage?		Y	
If samples are expected to become part of legal action, does the laboratory follow chain-of-custody procedures?		Y	
Maintenance of Records	8.2		
Does the public water system maintain records of microbiological analyses for five years?		Y	
Does the laboratory maintain easily accessible records for five years or until the next certification data audit is completed, whichever is longer?		Y	
Does the laboratory notify the client water system before disposing of records so they may request copies if needed?		Y	
Does the laboratory backup all electronic data by protected tape, disk, or hard copy?		Y	
When the laboratory changes its computer hardware or software, are provisions in place for transferring old data to the new system so that data remain retrievable within the specified time frames?		Y	
Sampling Records	8.3		
Are all data recorded in ink, with any changes lined through such that the original entry is visible?		Y	
Are changes initialed and dated?		Y	
Does the laboratory have the following sample information readily available?	8.3.1-4		
- Date and time of sample receipt by the laboratory		Y	
- Name of the laboratory person receiving the sample		Y	
- Information on any deficiency in the condition of the sample		Y	
Are samples invalidated for the following reasons?	8.3.4		
- Time between sample collection and receipt by laboratory exceeded		Y	
- Presence of disinfectant in sample noticed, e.g., odor		Y	
- Evidence of freezing		Y	
- Use of a container not approved by the laboratory for the purpose intended		Y	
- Insufficient sample volume, e.g., <100 mL		Y	
- Presence of interfering contaminants noticed, e.g., hydrocarbons, cleansers, heavy metals, etc.		Y	
- Sample temperature exceeding the maximum allowable		Y	
Analytical Records	8.4		
Are all recorded data in ink with any changes lined through such that original entry is visible?		Y	
Are these changes initialed and dated?		Y	
Are the following readily available?	8.4.1-6		

ELEMENT	ITEM	Y/N/O	COMMENTS
- Laboratory sample identification information		Y	
- Information concerning date and time analysis begins		Y	
- Name of the laboratory and a signature or initials of the person(s) performing analysis		Y	"QC" needs doc.
- Information concerning the analytical technique or method used		Y	
- Information concerning all items marked "QC"		Y	
- Results of the analyses		Y	
Preventive Maintenance	**8.5**		
Does the laboratory maintain preventive maintenance and repair records for all instruments and equipment?		Y	
Are these records kept for five years in a manner that allows for easy inspection?		Y	
9. ACTION RESPONSE TO LABORATORY RESULTS			
Testing Total Coliform-Positive Cultures	**9.1**		
For the Total Coliform Rule, does the laboratory test all total coliform-positive cultures for the presence of either fecal coliforms or E. coli?		Y	
Notification of Positive Results	9.2		
For Total Coliform Rule, does the laboratory promptly notify the proper authority of a positive total coliform, fecal coliform, or E. coli result, so that appropriate follow-up actions can be conducted?	9.2.1	Y	
For the Total Coliform Rule, if a sample is fecal coliform- or E. coli-positive, does the system notify the State as soon as it is notified of the test result, i.e., at the end of that day or, if the State office is closed, by the end of the next business day?	9.2.2	Y	
Does the laboratory base a total coliform-positive result on the confirmed phase if the Multiple Tube Fermentation Technique or Presence-Absence Coliform Test is used, or the verified test for the Membrane Filtration Technique if M-Endo medium or M-Endo LES agar is used?	9.2.3	Y	
If a presumptive total coliform-positive culture does not confirm/verify as such, but is found to be fecal coliform or E. coli-positive, is the sample considered total coliform-positive and fecal coliform/E. coli-positive?		Y	
Notification of Total Coliform Interference	**9.3**		
For the Total Coliform Rule, does the laboratory promptly notify the proper authority when results indicate non-coliforms may have interfered with total coliform analysis?		Y	

TOTAL ITEMS REVIEWED:	330
NUMBER OF ITEMS MEETING THE MINIMUM REQUIREMENTS:	329
NUMBER OF ITEMS NOT IN COMPLIANCE WITH MINIMUM REQUIREMENTS:	1
LABORAORY SCORE:	100%

MICROBIOLOGICAL:

TECHNIQUE	2005							
	OVERALL CERTIFICATION		PT SAMPLES				ON-SITE REVIEW 11/30/99	
		Method	A	NA	ND	Method		Method
Fermentation	C	SM9221 B&E	X			SM9221 B&E	C	SM9221 B&E
Membrane Filter	NC	SM9222B			X	SM9222B	C	SM9222B
Present-Absence (P-A) Coliform Test	NC							
ONPG-MUG Test (Colilert)	C	SM9223	X			SM9223	C	SM92223
Heterotrophic Plate Count (On-Site Only)	C	SM9215B	X			SM9215B HPC PT Required	C	SM9215B

WV
LT2

Chromogenic/Fluorogenic Substrate Test (Quanti Tray)

1.0 Introduction -

Colilert Reagent is used for the simultaneous detection and conformation of total coliforms and *E. coli* in water, which is based on the Defined Substrate Technology (DST). DST utilizes indicator-nutrient which cause target microbes contained in the sample and incubated in the DST reagent system to produce a color change (or another signal i.e., fluorescence), both indicating and confirming their presence. Coliforms as defined by this method are all bacteria that possess the enzyme β-D-galactosidase with *E. coli* also possessing the enzyme β-glucuronidase. The enzyme in Coliform will cleave the Chromegenic Substrate of the Test Reagent releasing the Chromogen just as the enzyme in *E. coli* will cleave the Fluorogenic Substrate releasing a fluorogen.

By utilizing the Quanti Tray System and 97 well trays, an estimation of coliform and *E. coli* density ranging from < 1 to > 2,419.2 can be determined from a single 100 mL sample portion. Higher counts can be determined by diluting the sample and multiplying the result by the appropriate dilution factor.

2.0 Sample Requirements-

2.1 Acceptance Criteria

2.1.1 For Compliance Samples: Maximum allowable elapsed time between sample collection and sample analysis is thirty (30) hours.

2.1.2 For Non-Compliance: Maximum allowable elapsed time between sample collection and sample analysis is forty eight (48) hours.

2.1.3 For Raw Source Waters (Surface, Ground, Spring): Maximum allowable elapsed time between sample collection and sample analysis is (8) hours. Temperature of receipt must be <10°C. If sample exceeds the 8 hours and 10°C, it is to be analyzed; however, "NOT VALID FOR SDWA COMPLIANCE REPORTING" must be checked under laboratory remarks. Samples exceeding 30 hours are not to be analyzed.

See 2.2 →

2.1.4 LT2 Monitoring (E. coli): Maximum allowable elapsed time between sample collection and sample analysis is thirty (30) hours. Temperature of receipt must be less than 10°C

2.2 Rejection Criteria

2.2.1 Insufficient air space to facilitate mixing of sample.

2.2.2 Sample contains residual chlorine. (Blue flash appears)

2.2.3 Sample exceeds maximum allowable time requirements as stated above.

2.2.4 Information on the Water Bacteriological Report Form (EM-1) is insufficient. (No date or time of collection)

2.2.5 Sample container was not furnished by the Office of Laboratory Services.

3.0 Sample Types -

3.1 Source Waters (Surface, including LT2 Samples; Ground; Spring and Bottled)

3.2 Dairy Farms

3.3 Sewage Suspects

3.4 Recreational Waters (Bathing Beaches - Summer 2001)

3.5 Any Sample Requiring a Total and *E. coli* count

3.6 Swimming Pools requiring an estimation of coliform density

3.7 Flood/Disaster Samples requiring an estimation of coliform density

4.0 Reagents and Equipment -

4.1 For Analysis:

4.1.1 35.0° ± 0.5°C Incubator. (Walk-In or Environette)

4.1.2 Long wavelength (366 nm) Ultraviolet Lamp.

4.1.3 Color and fluorescence comparator.

4.1.4 Clear, sterile, non-fluorescent 120 mL bottle. (Graduated at the 100 mL mark)

4.1.5 Colilert (or Colilert-18) Reagent.

4.1.6 70% Ethanol

4.1.7 Quanti Trays (97 well)

4.1.8 Quanti Tray Sealer

4.1.9 99 mL Sterile Water Dilution Blanks (If Dilutions Are Required)

4.1.10 10 mL Sterile Pipets (Samples Requiring a 10^{-1} Dilution)

4.1.11 1.1 mL Sterile Pipets (Samples Requiring a 10^{-2} Dilution)

4.2 For Quality Control:

4.2.1. Quanit Cult Organisms:

4.2.1.1 *Pseudomonas aeruginosa*

4.2.1.2 *Klebsiella pneumoniae*

4.2.1.3 *E. coli*

4.2.2 Tryptic Soy Broth. (TSB) (Single Strength and Double Strength)

4.2.3 Brom Cresol Purple Solution

5.0 Procedure -

5.1 General Procedures (100 mL and Dilutions)

5.1.1 Turn on Quanti Tray Sealer. Green light will come on when sealer is ready (approximately 20 minutes).

5.1.2 Sanitize area with 70% Ethanol and wash hands.

5.1.3 Record sample temperature on EM-1 Report form with infrared thermometer (LT2 E. coli samples only).

5.1.4 Shake sample 25 times in 7 seconds with a 1 foot movement.

5.1.5 Determine the appropriate dilution from the following table:

Dilution	Sample Type
Full 100 mL Volume	1. Raw Source Waters (Ground) 2. Raw Source Waters (Springs) 3. Raw Source Waters (Bottled Waters) 4.* Raw Source Waters (LT2 Monitoring) 5. Dairy Farms 6. Recreational Waters 7. Drinking Water (Public or Private) Requiring a Count
10^{-1}	1. Raw Source Waters (Surface) 2.* Raw Source Waters (LT2 Monitoring)
10^{-2}	1. Sewage Suspects and Ditches where high counts are expected. If unsure, a full 100 mL and 10-2 may be run on the same sample giving a range of <1 to > 241,920. 2.* Raw Source Waters (LT2 Monitoring)

*Each LT2 Monitoring Sample requires 3 separate dilutions.

5.2 *For 100 mL:*

5.2.1 Remove excess sample by pouring off or removing it with a 10 mL sterile pipet so that only 100 mL remains.

5.2.2 Add 1 packet of Colilert Reagent and shake to dissolve completely.

5.2.3 Label back of 97 well tray with the Lab Number, Date, Time and Dilution Factor (1X for 100 mL portion).

5.2.4 Pour sample into 97 well tray and tap on small wells to dislodge air bubbles.

5.2.5 Place tray in the rubber mold on the Quanti Tray Sealer and press "Seal".

5.2.6 Place in 35.0°±0.5°C incubator for 24 to 28 hours (27 to 28 perfered).

5.3 *For 10^{-1} Dilutions:*

5.3.1 Follow steps 5.2.1 thru 5.2.5 from above.

5.3.2 Add one packet of Colilert to a 90 mL sterile water blank, cap and shake to dissolve the reagent.

5.3.3 Pipet 10.0 mL of sample into the 90 mL sterile water blank.

5.3.4 Shake 25 time, in 7 seconds with a one foot movement.

5.3.5 Label back of 97 well tray with the Lab Number, Date, Time and Dilution Factor (10X for 10^{-1} dilution).

5.3.6 Pour sample into 97 well tray and tap on small wells to dislodge air bubbles.

5.3.7 Place tray in the rubber mold on the Quanti Tray Sealer and press "Seal".

5.3.8 Place in 35.0°±0.5°C incubator for 24 to 28 hours (27 to 28 perfered).

5.4 *For 10^{-2} Dilutions:*

5.4.1 Follow steps 5.2.1 thru 5.2.5 from above.

5.4.2 Add one packet of Colilert to a 99 mL sterile water blank, cap and shake to dissolve the reagent.

5.4.3 Pipet 1.0 mL of sample into the 99.0 mL sterile water blank.

5.4.4 Shake 25 time, in 7 seconds with a one foot movement.

5.4.5 Label back of 97 well tray with the Lab Number, Date, Time and Dilution Factor (100X for 10^{-2} dilution).

5.4.6 Pour sample into 97 well tray and tap on small wells to dislodge air bubbles.

5.4.7 Place tray in the rubber mold on the Quanti Tray Sealer and press "Seal".

5.4.8 Place in 35.0°±0.5°C incubator for 24 to 28 hours (27 to 28 perfered).

5.5 Reading, Interpreting and Reporting

5.5.1 Remove the trays from the incubator after 24 hours incubation. Samples must be removed from the incubator with 28 hours. Because the sample is divided into 97 portions, some of the wells are slower to develop the color change. Therefore, it is preferable to let the trays incubate 27-28 hours.

5.5.2 Examine each well on the tray for the presence of a yellow color (confirming the presence of coliform bacteria) that is equal to or greater than the compartor. Wells that are slightly yellow, but not as yellow as the comparator, must be place back into the incubator to incubate for the full 28 hours. Samples left in the incubator for more than 28 hours must be reported as "Laboratory Accident" unless they are clear.

5.5.3 Count the number of large wells (including the very large well at the top of the tray) and the number of small wells that have a yellow color equal to or greater than the comparator and record in the "Conf24" column on the "Colilert Bench Sheet" (Attachment #1) as follows: # Large Wells/# Small Wells * Dilution Factor.

5.5.4 All trays that contain at least one yellow well (Total Coliform Positive Samples) must be taken into the Walk-In Incubator and checked for fluorescence with the 366 nm UV light. Wells with fluoresce equal to or greater than the comparator are Positive for *E. coli* and must be marked with a marker.

5.5.5 Count the number of large wells and the number of small wells that fluoresce equal to or greater than the reference comparator and record in the "E. coli" column on the "Colilert Bench Sheet" (Attachment #1) as follows: # Large Wells / # Small Wells * Dilution Factor.

5.5.6 Using the IDEXX Quanti-Tray/2000 MPN Table (Attachment #2) determine the number of total coliforms and *E. coli* as follows:

5.5.6.1 For total coliforms - read down the chart for the number of large yellow wells and across the top for the number of small yellow wells. The point where the column and row intersect is the MPN value for total coliforms based on 100 mL of sample. If a 10^{-1} dilution of the original sample was made the MPN value must be multiplied by 10. If a 10^{-2} dilution of the original sample was made the MPN value must be multiplied by 100. Record the computed value as it appears on the chart in the "Total Coliform" column of the Colilert Bench Sheet.

5.5.6.2 For *E. coli* - read down the chart for the number of large fluorescing wells and across the top for the number of small fluorescing wells. The point where the column and row intersect is the MPN value for total coliforms based on 100 mL of sample. If a 10^{-1} dilution of the original sample was made the MPN value must be multiplied by 10. If a 10^{-2} dilution of the original sample was made the MPN value must be multiplied by 100. Record the computed value as it appears on the chart in the second "E. Coli" column of the Colilert Bench Sheet.

5.5.6.3 If all wells are clear (Negative for Total Coliforms) then record as "0/0 * Dilution Factor" in the "CONF/COLI" column on the "Colilert Bench Sheet" and report as < minimum detection limit in the "TOTAL" column. Minimum Detection Limits are as follows: < 1 for 100 mL portions, < 10 for 10^{-1} dilutions and < 100 for 10^{-2} dilutions.

5.5.7 Special Instructions for Computing and Reporting E. coli for LT2 Samples:

5.5.7.1 Since three different volumes (100 mL, 10, mL and 1.0 mL) of the same sample, the volume that yields the number of positive wells (# of Large Wells + # of Small Wells) in the countable range of 39 to 78 (40 to 80%) is the one that is to be used for reporting.

5.5.8 Record the date reported in the "Rpt Date" column and the initials of the analysts reading the results in the "Initials." column. Also, record the time the samples are read in the space to the right of the last column labeled "Read Time".

Note: The report date, analysts initials and time read may be recorded on the top line and then arrows drawn down. See example on Attachment #1.

5.5.9 After the data has been entered on the bench sheet for a particular sample then the Water Bacteriological Report Form (EM-1) is to be completed. Total Coliforms are to be marked as "Present" or "Absent". *E. coli* only has to be marked as "Present" or "Absent" if Total Coliforms are Present. The MPN value for total coliforms and *E. coli* is to then be recorded in the "_____ per 100 mL" space.

5.5.10 After all EM-1 forms are marked, they are to be placed in the basket labeled "Forms To Be Checked".

5.5.11 All forms are to be checked by a Microbiologist II or higher. All samples with Total Coliform Positive Results must be initialed by the analyst checking them on the bench sheet. Initials are to be placed to the right of the initials of the analyst reading the test. (See Attachment #1).

6.0 Quality Control

6.1 Colilert Quality Control

6.1.1 See procedure Chromogenic/Fluorogenic Substrate Test (Colilert 100 mL), Section VI.

6.2 Additional Quality Control for the Quanti Tray:

6.2.1 On a monthly basis, add 100 mL of a bromcresol purlple solution to a 97 well tray and seal. Check for any leaks and record the results on the "Quanti Tray Sealer - Leak Check" form (Attachment #3)

Attachment #1
Colilert Bench Sheet

BENCH SHEET- COLILERT

Lab Sample	Code	County	Collect Dt	Analysis Dt	Name/Co	Collector	Sample Lo	Conl24	E. coli	Total Coliform	E. Coli	Rpl Date	Initials	Read Time
46467	3A	MASON	10/16/2006	10/17/2006		HITE	HAMBRICK					10/18	DP	12:20 p.
46468	3A	ROANE	10/16/2006	10/17/2006		PARSONS	THRIFTWA							
46469	3A	MASON	10/16/2006	10/17/2006		HITE	WALNUT C							
46470	8I	PUTNAM	10/16/2006	10/17/2006		LYONS IOK	PLANT	4429	8/0	5794	218			cm
46471	3A	PUTNAM	10/16/2006	10/17/2006		LYONS	WINFIELD							
46472	3A	PUTNAM	10/16/2006	10/17/2006		LYONS	1401 HOSP							
46473	8I	PUTNAM	10/16/2006	10/17/2006		LYONS IOK	PLANT	4430	243	6131	308			cm
46474	3A	PUTNAM	10/16/2006	10/17/2006		LYONS	ELANOR E							
46475	3A	PUTNAM	10/16/2006	10/17/2006		LYONS	J'S HILLYBI							
46476	3A	PUTNAM	10/16/2006	10/17/2006		LYONS	BUFFALO E							
46477	3A	PUTNAM	10/16/2006	10/17/2006		LYONS	MCDONAL							
46478	3A	FAYETTE	10/16/2006	10/17/2006		BLAKE	PUBLIC RE							
46479	3A	JACKSON	10/16/2006	10/17/2006		KV	END GOSH							
46480	3A	MASON	10/16/2006	10/17/2006		HITE	APPLE GR							
46481	3A	WYOMING	10/16/2006	10/17/2006		ENGLAND	MAINT SHO							
46482	3A	WYOMING	10/16/2006	10/17/2006		SB	KIT							
46483	3A	FAYETTE	10/16/2006	10/17/2006		BLAKE	WATER PL							
46484	3A	ROANE	10/16/2006	10/17/2006		PARSONS	ABBOTTS							
46485	3B	MASON	10/16/2006	10/17/2006		WAUGH	CAMPGRO	1	-	P	A			cm
46486	3A	MASON	10/16/2006	10/17/2006		HITE	SADDLE C	1	-	P	A			cm
46487	3A	MASON	10/16/2006	10/17/2006		HITE	SADDLE C							
46488	3A	ROANE	10/16/2006	10/17/2006		STARCHER	STATION BI							
46489	3A	MERCER	10/16/2006	10/17/2006		BELCHER	PONY FAR							
46490	3A	MERCER	10/16/2006	10/17/2006		BELCHER	WWTP							
46491	3A	MERCER	10/16/2006	10/17/2006		BELCHER	RYAN VILL							
46492	3A	LOGAN	10/16/2006	10/17/2006		MOUNTS	PAT BROW							
46493	3A	LOGAN	10/16/2006	10/17/2006		MOUNTS	M&M DAIR							

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Note: "Name/Co" have been hidden to protect privacy.

Attachment #2

IDEXX Quanti-Tray®/2000 MPN Table *(per 100ml)*

# Large Wells Positive	# Small Wells Positive																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	<1	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.1	15.1	16.1	17.1	18.1	19.1	20.2	21.2	22.2	23.3	24.3
1	1.0	2.0	3.0	4.0	5.0	6.0	7.1	8.1	9.1	10.1	11.1	12.1	13.2	14.2	15.2	16.2	17.3	18.3	19.3	20.4	21.4	22.4	23.5	24.5	25.6
2	2.0	3.0	4.1	5.1	6.1	7.1	8.1	9.2	10.2	11.2	12.2	13.3	14.3	15.4	16.4	17.4	18.5	19.5	20.6	21.6	22.7	23.7	24.8	25.8	26.9
3	3.1	4.1	5.1	6.1	7.2	8.2	9.2	10.3	11.3	12.4	13.4	14.5	15.5	16.5	17.6	18.6	19.7	20.8	21.8	22.9	23.9	25.0	26.1	27.1	28.2
4	4.1	5.2	6.2	7.2	8.3	9.3	10.4	11.4	12.5	13.5	14.6	15.6	16.7	17.8	18.8	19.9	21.0	22.0	23.1	24.2	25.3	26.3	27.4	28.5	29.6
5	5.2	6.3	7.3	8.4	9.4	10.5	11.5	12.6	13.7	14.7	15.8	16.9	17.9	19.0	20.1	21.2	22.2	23.3	24.4	25.5	26.6	27.7	28.8	29.9	31.0
6	6.3	7.4	8.4	9.5	10.6	11.6	12.7	13.8	14.9	16.0	17.0	18.1	19.2	20.3	21.4	22.5	23.6	24.7	25.8	26.9	28.0	29.1	30.2	31.3	32.4
7	7.5	8.5	9.6	10.7	11.8	12.8	13.9	15.0	16.1	17.2	18.3	19.4	20.5	21.6	22.7	23.8	24.9	26.0	27.1	28.3	29.4	30.5	31.6	32.8	33.9
8	8.6	9.7	10.8	11.9	13.0	14.1	15.2	16.3	17.4	18.5	19.6	20.7	21.8	22.9	24.1	25.2	26.3	27.4	28.6	29.7	30.8	32.0	33.1	34.3	35.4
9	9.8	10.9	12.0	13.1	14.2	15.3	16.4	17.6	18.7	19.8	20.9	22.0	23.2	24.3	25.4	26.6	27.7	28.9	30.0	31.2	32.3	33.5	34.6	35.8	37.0
10	11.0	12.1	13.2	14.4	15.5	16.6	17.7	18.9	20.0	21.1	22.3	23.4	24.6	25.7	26.9	28.0	29.2	30.3	31.5	32.7	33.8	35.0	36.2	37.4	38.6
11	12.2	13.4	14.5	15.6	16.8	17.9	19.1	20.2	21.4	22.5	23.7	24.8	26.0	27.2	28.3	29.5	30.7	31.9	33.0	34.2	35.4	36.6	37.8	39.0	40.2
12	13.5	14.6	15.8	16.9	18.1	19.3	20.4	21.6	22.8	23.9	25.1	26.3	27.5	28.6	29.8	31.0	32.2	33.4	34.6	35.8	37.0	38.2	39.5	40.7	41.9
13	14.8	16.0	17.1	18.3	19.5	20.6	21.8	23.0	24.2	25.4	26.6	27.8	29.0	30.2	31.4	32.6	33.8	35.0	36.2	37.5	38.7	39.9	41.2	42.4	43.6
14	16.1	17.3	18.5	19.7	20.9	22.1	23.3	24.5	25.7	26.9	28.1	29.3	30.5	31.7	33.0	34.2	35.4	36.7	37.9	39.1	40.4	41.6	42.9	44.2	45.4
15	17.5	18.7	19.9	21.1	22.3	23.5	24.7	25.9	27.2	28.4	29.6	30.9	32.1	33.3	34.6	35.8	37.1	38.4	39.6	40.9	42.2	43.4	44.7	46.0	47.3
16	18.9	20.1	21.3	22.6	23.8	25.0	26.2	27.5	28.7	30.0	31.2	32.5	33.7	35.0	36.3	37.5	38.8	40.1	41.4	42.7	44.0	45.3	46.6	47.9	49.2
17	20.3	21.6	22.8	24.1	25.3	26.6	27.8	29.1	30.3	31.6	32.9	34.1	35.4	36.7	38.0	39.3	40.6	41.9	43.2	44.5	45.9	47.2	48.5	49.8	51.2
18	21.8	23.1	24.3	25.6	26.9	28.1	29.4	30.7	32.0	33.3	34.6	35.9	37.2	38.5	39.8	41.1	42.4	43.8	45.1	46.5	47.8	49.2	50.5	51.9	53.2
19	23.3	24.6	25.9	27.2	28.5	29.8	31.1	32.4	33.7	35.0	36.3	37.6	39.0	40.3	41.6	43.0	44.3	45.7	47.1	48.4	49.8	51.2	52.6	54.0	55.4
20	24.9	26.2	27.5	28.8	30.1	31.5	32.8	34.1	35.4	36.8	38.1	39.5	40.8	42.2	43.6	44.9	46.3	47.7	49.1	50.5	51.9	53.3	54.7	56.1	57.6
21	26.5	27.9	29.2	30.5	31.8	33.2	34.5	35.9	37.3	38.6	40.0	41.4	42.8	44.1	45.5	46.9	48.4	49.8	51.2	52.6	54.1	55.5	56.9	58.4	59.8
22	28.2	29.5	30.9	32.3	33.6	35.0	36.4	37.7	39.1	40.5	41.9	43.3	44.8	46.2	47.6	49.0	50.5	51.9	53.4	54.8	56.3	57.8	59.3	60.8	62.3
23	29.9	31.3	32.7	34.1	35.5	36.9	38.3	39.7	41.1	42.5	43.9	45.4	46.8	48.3	49.7	51.2	52.7	54.2	55.6	57.1	58.6	60.2	61.7	63.2	64.7
24	31.7	33.1	34.5	35.9	37.3	38.8	40.2	41.7	43.1	44.6	46.0	47.5	49.0	50.5	52.0	53.5	55.0	56.5	58.0	59.5	61.1	62.6	64.2	65.8	67.3
25	33.6	35.0	36.4	37.9	39.3	40.8	42.2	43.7	45.2	46.7	48.2	49.7	51.2	52.7	54.3	55.8	57.3	58.9	60.5	62.0	63.6	65.2	66.8	68.4	70.0
26	35.5	36.9	38.4	39.9	41.4	42.8	44.3	45.9	47.4	48.9	50.4	52.0	53.5	55.1	56.7	58.2	59.8	61.4	63.0	64.7	66.3	67.9	69.6	71.2	72.9
27	37.4	38.9	40.4	42.0	43.5	45.0	46.5	48.1	49.6	51.2	52.8	54.4	56.0	57.6	59.2	60.8	62.4	64.1	65.7	67.4	69.1	70.8	72.5	74.2	75.9
28	39.5	41.0	42.6	44.1	45.7	47.3	48.8	50.4	52.0	53.6	55.2	56.9	58.5	60.2	61.8	63.5	65.2	66.9	68.6	70.3	72.0	73.7	75.5	77.3	79.0
29	41.7	43.2	44.8	46.4	48.0	49.6	51.2	52.8	54.5	56.1	57.8	59.5	61.2	62.9	64.6	66.3	68.0	69.8	71.5	73.3	75.1	76.9	78.7	80.5	82.4
30	43.9	45.5	47.1	48.7	50.4	52.0	53.7	55.4	57.1	58.8	60.5	62.2	64.0	65.7	67.5	69.3	71.0	72.9	74.7	76.5	78.3	80.2	82.1	84.0	85.9
31	46.2	47.9	49.6	51.2	52.9	54.6	56.3	58.1	59.8	61.6	63.3	65.1	66.9	68.7	70.5	72.4	74.2	76.1	78.0	79.9	81.8	83.7	85.7	87.6	89.6
32	48.7	50.4	52.1	53.8	55.6	57.3	59.1	60.9	62.7	64.5	66.3	68.2	70.0	71.9	73.8	75.7	77.6	79.5	81.5	83.5	85.4	87.5	89.5	91.5	93.6
33	51.2	53.0	54.8	56.5	58.3	60.2	62.0	63.8	65.7	67.6	69.5	71.4	73.3	75.2	77.2	79.2	81.2	83.2	85.2	87.3	89.3	91.4	93.6	95.7	97.9
34	53.9	55.7	57.6	59.4	61.3	63.1	65.0	67.0	68.9	70.8	72.8	74.8	76.8	78.8	80.8	82.9	85.0	87.1	89.2	91.4	93.5	95.7	97.9	100.2	102.4
35	56.8	58.6	60.5	62.4	64.4	66.3	68.2	70.3	72.3	74.3	76.3	78.4	80.5	82.6	84.7	86.9	89.1	91.3	93.5	95.7	98.0	100.3	102.6	105.0	107.3
36	59.8	61.7	63.7	65.7	67.7	69.7	71.7	73.8	75.9	78.0	80.1	82.3	84.5	86.7	88.9	91.2	93.5	95.8	98.1	100.5	102.9	105.3	107.7	110.2	112.7
37	62.9	65.0	67.0	69.1	71.2	73.3	75.4	77.6	79.8	82.0	84.2	86.5	88.8	91.1	93.4	95.8	98.2	100.6	103.1	105.6	108.1	110.7	113.3	115.9	118.6
38	66.3	68.4	70.6	72.7	74.9	77.1	79.4	81.6	83.9	86.2	88.6	91.0	93.4	95.8	98.3	100.8	103.4	105.9	108.6	111.2	113.9	116.6	119.4	122.2	125.0
39	70.0	72.2	74.4	76.7	78.9	81.3	83.6	86.0	88.4	90.9	93.4	95.9	98.4	101.0	103.6	106.3	109.0	111.8	114.6	117.4	120.3	123.2	126.1	129.2	132.2
40	73.8	76.2	78.5	80.9	83.3	85.7	88.2	90.8	93.3	95.9	98.5	101.2	103.9	106.7	109.5	112.4	115.3	118.2	121.2	124.3	127.4	130.5	133.7	137.0	140.3
41	78.0	80.5	83.0	85.5	88.0	90.6	93.3	95.9	98.7	101.4	104.3	107.1	110.0	113.0	116.0	119.1	122.2	125.4	128.7	132.0	135.4	138.8	142.3	146.0	149.5
42	82.6	85.2	87.8	90.5	93.2	96.0	98.8	101.7	104.6	107.6	110.6	113.7	116.9	120.1	123.4	126.7	130.1	133.6	137.2	140.8	144.5	148.3	152.2	156.1	160.2
43	87.6	90.4	93.2	96.0	99.0	101.9	105.0	108.1	111.2	114.5	117.8	121.1	124.6	128.1	131.7	135.4	139.1	143.0	147.0	151.0	155.2	159.4	163.8	168.2	172.8
44	93.1	96.1	99.1	102.2	105.4	108.6	111.9	115.3	118.7	122.3	125.9	129.6	133.4	137.4	141.4	145.5	149.7	154.1	158.5	163.1	167.9	172.7	177.7	182.9	188.2
45	99.3	102.5	105.8	109.2	112.6	116.2	119.8	123.6	127.4	131.4	135.4	139.6	143.9	148.3	152.9	157.6	162.4	167.4	172.6	178.0	183.6	189.2	195.1	201.2	207.5
46	106.3	109.8	113.4	117.2	121.0	125.0	129.1	133.3	137.6	142.1	146.7	151.5	156.5	161.6	167.0	172.5	178.2	184.2	190.4	196.8	203.5	210.5	217.8	225.4	233.3
47	114.3	118.3	122.4	126.6	130.9	135.4	140.1	146.0	150.0	155.3	160.7	166.4	172.3	178.5	185.0	191.8	198.9	206.4	214.2	222.4	231.0	240.0	249.5	259.5	270.0
48	123.9	128.4	133.1	137.9	143.0	148.3	153.9	159.7	165.8	172.2	178.9	186.0	193.5	201.4	209.8	218.7	228.2	238.2	248.9	260.3	272.3	286.1	298.7	313.0	328.2
49	135.5	140.8	146.4	152.3	158.5	165.0	172.0	179.3	187.2	195.6	204.6	214.3	224.7	235.9	248.1	261.3	275.5	290.9	307.6	325.5	344.8	365.4	387.3	410.6	435.2

09-83235-01

IDEXX Quanti-Tray®/2000 MPN Table *(per 100ml)*

# Large Wells Positive	# Small Wells Positive																							
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
0	25.3	26.4	27.4	28.4	29.5	30.5	31.5	32.6	33.6	34.7	35.7	36.8	37.8	38.9	40.0	41.0	42.1	43.1	44.2	45.3	46.3	47.4	48.5	49.5
1	26.6	27.7	28.7	29.8	30.8	31.9	32.9	34.0	35.0	36.1	37.2	38.2	39.3	40.4	41.4	42.5	43.6	44.7	45.7	46.8	47.9	49.0	50.1	51.2
2	27.9	29.0	30.0	31.1	32.2	33.2	34.3	35.4	36.5	37.5	38.6	39.7	40.8	41.9	43.0	44.0	45.1	46.2	47.3	48.4	49.5	50.6	51.7	52.8
3	29.3	30.4	31.4	32.5	33.6	34.7	35.8	36.8	37.9	39.0	40.1	41.2	42.3	43.4	44.5	45.6	46.7	47.8	48.9	50.0	51.2	52.3	53.4	54.5
4	30.7	31.8	32.8	33.9	35.0	36.1	37.2	38.3	39.4	40.5	41.6	42.8	43.9	45.0	46.1	47.2	48.3	49.5	50.6	51.7	52.9	54.0	55.1	56.3
5	32.1	33.2	34.3	35.4	36.5	37.6	38.7	39.9	41.0	42.1	43.2	44.4	45.5	46.6	47.7	48.9	50.0	51.2	52.3	53.5	54.6	55.8	56.9	58.1
6	33.5	34.7	35.8	36.9	38.0	39.2	40.3	41.4	42.6	43.7	44.8	46.0	47.1	48.3	49.4	50.6	51.7	52.9	54.1	55.2	56.4	57.6	58.7	59.9
7	35.0	36.2	37.3	38.4	39.6	40.7	41.9	43.0	44.2	45.3	46.5	47.7	48.8	50.0	51.2	52.3	53.5	54.7	55.9	57.1	58.3	59.4	60.6	61.8
8	36.6	37.7	38.9	40.0	41.2	42.3	43.5	44.7	45.9	47.0	48.2	49.4	50.6	51.8	53.0	54.1	55.3	56.5	57.7	59.0	60.2	61.4	62.6	63.8
9	38.1	39.3	40.5	41.6	42.8	44.0	45.2	46.4	47.6	48.8	50.0	51.2	52.4	53.6	54.8	56.0	57.2	58.4	59.7	60.9	62.1	63.4	64.6	65.8
10	39.7	40.9	42.1	43.3	44.5	45.7	46.9	48.1	49.3	50.6	51.8	53.0	54.2	55.5	56.7	57.9	59.2	60.4	61.7	62.9	64.2	65.4	66.7	67.9
11	41.4	42.6	43.8	45.0	46.3	47.5	48.7	49.9	51.2	52.4	53.7	54.9	56.1	57.4	58.6	59.9	61.2	62.4	63.7	65.0	66.3	67.5	68.8	70.1
12	43.1	44.3	45.6	46.8	48.1	49.3	50.6	51.8	53.1	54.3	55.6	56.8	58.1	59.4	60.7	62.0	63.2	64.5	65.8	67.1	68.4	69.7	71.0	72.4
13	44.9	46.1	47.4	48.6	49.9	51.2	52.5	53.7	55.0	56.3	57.6	58.9	60.2	61.5	62.8	64.1	65.4	66.7	68.0	69.3	70.7	72.0	73.3	74.7
14	46.7	48.0	49.3	50.5	51.8	53.1	54.4	55.7	57.0	58.3	59.6	60.9	62.3	63.6	64.9	66.3	67.6	68.9	70.3	71.6	73.0	74.4	75.7	77.1
15	48.6	49.9	51.2	52.5	53.8	55.1	56.4	57.8	59.1	60.4	61.8	63.1	64.5	65.8	67.2	68.5	69.9	71.3	72.6	74.0	75.4	76.8	78.2	79.6
16	50.5	51.8	53.2	54.5	55.8	57.2	58.5	59.9	61.2	62.6	64.0	65.3	66.7	68.1	69.5	70.9	72.3	73.7	75.1	76.5	77.9	79.3	80.8	82.2
17	52.5	53.9	55.2	56.6	58.0	59.3	60.7	62.1	63.5	64.9	66.3	67.7	69.1	70.5	71.9	73.3	74.8	76.2	77.6	79.1	80.5	82.0	83.5	84.9
18	54.6	56.0	57.4	58.8	60.2	61.6	63.0	64.4	65.8	67.2	68.6	70.1	71.5	73.0	74.4	75.9	77.3	78.8	80.3	81.8	83.3	84.8	86.3	87.8
19	56.8	58.2	59.6	61.0	62.4	63.9	65.3	66.8	68.2	69.7	71.1	72.6	74.1	75.5	77.0	78.5	80.0	81.5	83.1	84.6	86.1	87.6	89.2	90.7
20	59.0	60.4	61.9	63.3	64.8	66.3	67.7	69.2	70.7	72.2	73.7	75.2	76.7	78.2	79.8	81.3	82.8	84.4	85.9	87.5	89.1	90.7	92.2	93.8
21	61.3	62.8	64.3	65.8	67.3	68.8	70.3	71.8	73.3	74.9	76.4	77.9	79.5	81.1	82.6	84.2	85.8	87.4	89.0	90.6	92.2	93.8	95.4	97.1
22	63.9	65.3	66.8	68.3	69.8	71.4	72.9	74.5	76.1	77.6	79.2	80.8	82.4	84.0	85.6	87.2	88.9	90.5	92.1	93.8	95.5	97.1	98.8	100.5
23	66.3	67.8	69.4	71.0	72.6	74.1	75.7	77.3	78.9	80.5	82.2	83.8	85.4	87.1	88.7	90.4	92.1	93.8	95.5	97.2	98.9	100.6	102.4	104.1
24	68.9	70.5	72.1	73.7	75.3	77.0	78.6	80.3	81.9	83.6	85.2	86.9	88.6	90.3	92.0	93.8	95.5	97.2	99.0	100.7	102.5	104.3	106.1	107.9
25	71.7	73.3	75.0	76.6	78.3	80.0	81.7	83.3	85.1	86.8	88.5	90.2	92.0	93.7	95.5	97.3	99.1	100.9	102.7	104.5	106.3	109.2	110.0	111.9
26	74.6	76.3	78.0	79.7	81.4	83.1	84.8	86.6	88.4	90.1	91.9	93.7	95.5	97.3	99.2	101.0	102.9	104.7	106.6	108.5	110.4	112.3	114.2	116.2
27	77.6	79.4	81.1	82.9	84.6	86.4	88.2	90.0	91.9	93.7	95.5	97.4	99.3	101.2	103.1	105.0	106.9	108.8	110.8	112.7	114.7	116.7	118.7	120.7
28	80.8	82.6	84.4	86.3	88.1	89.9	91.8	93.7	95.6	97.5	99.4	101.3	103.3	105.2	107.2	109.2	111.2	113.2	115.2	117.3	119.3	121.4	123.5	125.6
29	84.2	86.1	87.9	89.8	91.7	93.7	95.6	97.5	99.5	101.5	103.5	105.5	107.5	109.5	111.6	113.7	115.7	117.8	120.0	122.1	124.2	126.4	128.6	130.8
30	87.8	89.7	91.7	93.6	95.6	97.6	99.6	101.6	103.7	105.7	107.8	109.9	112.0	114.2	116.3	118.5	120.6	122.8	125.1	127.3	129.5	131.8	134.1	136.4
31	91.6	93.6	95.6	97.7	99.7	101.8	103.9	106.0	108.2	110.3	112.5	114.7	116.9	119.1	121.4	123.6	125.9	128.2	130.5	132.9	135.3	137.7	140.1	142.5
32	95.7	97.8	99.9	102.0	104.2	106.3	108.5	110.7	113.0	115.2	117.5	119.8	122.1	124.5	126.8	129.2	131.6	134.0	136.5	139.0	141.5	144.0	146.6	149.1
33	100.0	102.2	104.4	106.6	108.9	111.2	113.5	115.8	118.2	120.5	122.9	125.4	127.8	130.3	132.8	135.3	137.8	140.4	143.0	145.6	148.3	150.9	153.7	156.4
34	104.7	107.0	109.3	111.7	114.0	116.4	118.9	121.3	123.8	126.3	128.8	131.4	134.0	136.6	139.2	141.9	144.6	147.4	150.1	152.9	155.7	158.6	161.5	164.4
35	109.7	112.2	114.6	117.1	119.6	122.2	124.7	127.3	129.9	132.6	135.3	138.0	140.8	143.6	146.4	149.2	152.1	155.0	158.0	161.0	164.0	167.1	170.2	173.3
36	115.2	117.8	120.4	123.0	125.7	128.4	131.1	133.9	136.7	139.5	142.4	145.3	148.3	151.3	154.3	157.3	160.5	163.6	166.8	170.0	173.3	176.6	179.9	183.3
37	121.3	124.0	126.8	129.6	132.4	135.3	138.2	141.2	144.2	147.3	150.3	153.5	156.7	159.9	163.1	166.5	169.8	173.2	176.7	180.2	183.7	187.3	191.0	194.7
38	127.9	130.8	133.8	136.8	139.9	143.0	146.2	149.4	152.6	155.9	159.2	162.6	166.1	169.6	173.2	176.8	180.4	184.2	188.0	191.8	195.7	199.7	203.7	207.7
39	135.3	138.5	141.7	145.0	148.3	151.7	155.1	158.6	162.1	165.7	169.4	173.1	176.9	180.7	184.7	188.7	192.7	196.8	201.0	205.3	209.6	214.0	218.5	223.0
40	143.7	147.1	150.6	154.2	157.8	161.6	165.3	169.1	173.0	177.0	181.1	185.2	189.4	193.7	198.1	202.5	207.1	211.7	216.4	221.1	226.0	231.0	236.0	241.1
41	153.2	157.0	160.9	164.8	168.9	173.0	177.2	181.5	185.8	190.3	194.8	199.5	204.2	209.1	214.0	219.1	224.2	229.4	234.8	240.2	245.8	251.5	257.2	263.1
42	164.3	168.6	172.9	177.3	181.9	186.5	191.3	196.1	201.1	206.2	211.4	216.7	222.2	227.7	233.4	239.2	245.2	251.3	257.5	263.8	270.3	276.9	283.6	290.6
43	177.5	182.3	187.3	192.4	197.6	202.9	208.4	214.0	219.8	225.8	231.8	238.1	244.5	251.0	257.7	264.6	271.7	278.9	286.3	293.8	301.5	309.4	317.4	325.7
44	193.6	199.3	205.1	211.0	217.2	223.5	230.0	236.7	243.6	250.8	258.1	265.6	273.3	281.2	289.4	297.8	306.3	315.1	324.1	333.3	342.8	352.4	362.3	372.4
45	214.1	220.9	227.9	235.2	242.7	250.4	258.4	266.7	275.3	284.1	293.3	302.6	312.3	322.3	332.5	343.0	353.8	364.9	376.2	387.9	399.8	412.0	424.5	437.4
46	241.5	250.0	258.9	268.2	277.8	287.8	298.1	308.8	319.9	331.4	343.3	355.5	368.1	381.1	394.5	408.3	422.5	437.1	452.0	467.4	483.3	499.6	516.3	533.5
47	280.9	292.4	304.4	316.9	330.0	343.6	357.8	372.6	387.7	403.4	419.8	436.6	454.1	472.1	490.7	509.9	529.8	550.4	571.7	593.8	616.7	640.5	665.3	691.0
48	344.1	360.9	378.4	396.8	416.0	436.0	456.9	478.6	501.2	524.7	549.3	574.8	601.5	629.4	658.6	689.3	721.5	755.6	791.5	829.7	870.4	913.9	960.6	1011.2
49	461.1	498.4	517.2	547.5	579.4	613.1	648.8	686.7	727.0	770.1	816.4	866.4	920.8	980.4	1046.2	1119.9	1203.3	1299.7	1413.6	1553.1	1732.9	1986.3	2419.6	>2419.6

09-63235-01

Attachment #3

QUANTI TRAY SEALER

LEAK CHECKS

Date	Sealer S/N (Model)	Observations	Q-Tray Lot #	Exp Date	Comments	Initials
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				
	❑ 145135 (2020) ❑ 01557 (2X)	❑ Okay – No Leaks ❑ Do Not Use – Leaks Detected				

****
*** ACTIVITY REPORT ***
****

ST. TIME	DESTINATION TEL/ID	NO.	MODE		PGS.	RESULT
*05/31 16:41	913014998816	0377	TRANSMIT	ECM	3	OK 00'19
*06/01 09:55	410 758 0515	5287	AUTO RX	ECM	2	OK 00'40
*06/01 11:51	912158143254	0378	TRANSMIT	ECM	2	OK 00'24
*06/01 14:20		5288	AUTO RX	ECM	1	OK 00'41
*06/01 15:48	914108194070	0379	TRANSMIT	ECM	2	OK 00'33
*06/01 16:21		5289	AUTO RX	ECM	1	OK 00'39
*06/02 05:17		5290	AUTO RX	ECM	1	OK 00'41
*06/02 05:44		5291	AUTO RX	ECM	1	OK 01'04
*06/02 07:41		5292	AUTO RX	ECM	1	OK 00'40
*06/02 18:33		5293	AUTO RX	ECM	1	OK 00'38
*06/04 04:33		5294	AUTO RX	ECM	1	OK 00'56
*06/04 07:27	609 860 8381	5295	AUTO RX	ECM	1	OK 01'18
*06/04 10:24	2675400049	5296	AUTO RX	ECM	7	OK 02'13
*06/04 10:54	2675400049	5297	AUTO RX	ECM	3	OK 00'59
*06/04 10:58	912675400049	0380	TRANSMIT	ECM	7	OK 01'32
*06/05 10:20	912025351363	0381	TRANSMIT	G3	5	OK 04'15
*06/05 15:19	912025351363	0382	TRANSMIT	G3	4	OK 03'18
*06/05 17:03	202 535 1362	5298	AUTO RX	G3	2	OK 02'13
*06/06 08:37		5299	AUTO RX	ECM	1	OK 00'30
*06/06 11:05	912025351363	0383	TRANSMIT	G3	2	OK 01'15
*06/06 14:05	912025351363	0384	TRANSMIT	G3	2	OK 02'16
*06/06 16:27	918026576009	0385	TRANSMIT	ECM	3	OK 00'35
*06/06 16:29	912762365061	0386	TRANSMIT	ECM	3	OK 01'27
*06/06 16:58	202 535 1362	5300	AUTO RX	G3	2	OK 02'10
*06/07 10:52	703 359 4679	5301	AUTO RX	ECM	2	OK 00'28
*06/07 11:18	912037865287	0387	TRANSMIT	ECM	2	OK 00'54
*06/11 10:39	913013369870	0389	TRANSMIT	ECM	28	OK 09'56
*06/11 10:52	3013369870	0388	TRANSMIT		0	NG 00'00
						0 #0018
*06/12 07:16	609 860 8381	5302	AUTO RX	ECM	1	OK 00'41
*06/13 12:13	913012105000	0390	TRANSMIT	ECM	2	OK 00'15
*06/14 08:57	215 814 2905	5303	AUTO RX	ECM	5	OK 01'11
*06/14 10:29		5304	AUTO RX	ECM	1	OK 00'27
*06/14 11:41	202 535 1362	5305	AUTO RX	G3	4	OK 02'27
*06/14 11:55	912158143159	0391	TRANSMIT	ECM	6	OK 03'30
*06/14 14:39	4107994374	0392	TRANSMIT		0	NG 00'00
						0 #0018
*06/18 08:04		5306	AUTO RX	ECM	1	OK 00'32
*06/18 08:51		5307	AUTO RX	ECM	3	OK 00'51
06/18 11:30	913045588377	0393	TRANSMIT		0	NG 00'28
						0 STOP
06/18 11:31	913045588337	0394	TRANSMIT	ECM	7	OK 01'07
06/18 11:33	913045582006	0395	TRANSMIT	ECM	7	OK 01'11

On-Site Laboratory Evaluation Report (SDWA)

Date of Report: October 24, 2006

Microbiology

Environmental Microbiology Section
Office of Laboratory Services
Bureau for Public Health
West Virginia Department of Health and Human Services
167 11th Avenue
South Charleston, WV 25303

Date of Assessment: September 19-20, 2006

by

David E. Russell

U.S. Environmental Protection Agency, Region III
Office of Analytical Services and Quality Assurance
701 Mapes Road
Fort Meade, MD 20755-5350

A. Introduction:

On September 19-20, 2006, an evaluation of the Environmental Microbiology Section of the West Virginia Office of Laboratory Services, located in Charleston, was conducted to determine the capability of the Laboratory to perform its mission as it relates to the Safe Drinking Water Act. The Laboratory was last evaluated in June, 2003.

The Environmental Microbiology Section (hereafter, the Laboratory) is currently analyzing drinking water for total coliform and fecal coliform (or *Escherichia coli*) using either Multiple Tube Fermentation (MTF) or Colilert. Although not performed routinely, the Laboratory also has the capability to analyze drinking water using Membrane Filtration (MF). In addition, Heterotrophic Plate Counts (HPC), using the pour plate method, are regularly performed, but not on drinking water compliance samples. The Laboratory wishes to maintain certification for all four methods: MTF, Colilert, MF, and HPC. In addition, it seeks certification for the quantitative Colilert method (Quanti-tray) in order to comply with the Long-term Enhanced Surface Water Treatment Rule.

The Laboratory is to be congratulated for the record of PT sample analysis it has established over the past three years. In 2004, 2005, and 2006 the Laboratory successfully analyzed PT sample sets using the MTF, Colilert, and MF methods. All three methods were evaluated each year. In 2005, a PT sample set was analyzed using MF, but mistakenly not reported. The Assessor examined the bench sheet and the final results (from ERA, WS103) and determined that the two were in complete agreement. In addition, the Laboratory successfully analyzed a PT sample using the quantitative Colilert method (Quanti-tray).

The equipment and procedures employed in the bacteriological analyses of drinking water by this laboratory conform with the provisions of the *Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition (2005, U.S. EPA), except as described in Sections C and D below.

B. Personnel:

The following personnel currently analyze drinking water or source water for total coliforms, fecal coliforms, (or *E.coli*), or the heterotrophic plate count.

Tom Ong	Microbiologist Supervisor
Mike Flesher	Microbiologist III
Tracey Goodson	Microbiologist III
Carole Moore	Microbiologist II
Deborah Peters	Laboratory Assistant III

The assessor wishes to thank these individuals for their cooperation and assistance during the on-site evaluation. Tom Ong was especially helpful and generous with his time.

C. General Findings:

General Findings include specific incidences of non-conformance with the equipment and analytical procedures required by the *Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition (2005, U.S. EPA), or laboratory procedures that, in the opinion of the assessor, jeopardize the generation of valid data.

There are no general findings.

D. Recommendations:

The following remarks are offered as suggestions to help improve the quality and integrity of the data the Laboratory generates. Note that all paragraph numbers and quotes are from Chapter V of the *Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition (2005, U.S. EPA) unless otherwise indicated.

1. The Laboratory's "Water Bacteriological Report" was revised in July, 2006, and a number of improvements were made over the previous version. It now contains extensive information on sample collection and analysis. Particularly noteworthy, are the sample rejection criteria listed on the form, so that in the event a sample is rejected, the reason for rejection is indicated. In some cases a sample may be analyzed even though it failed to meet a required holding time or transport temperature. In such cases a box on the report form labeled "Not valid for SDWA compliance reporting" is checked. The Laboratory is to be commended for this practice. A problem arises, however, when the same results are entered into the Laboratory's computer database (an MS Access database) and the data is sent via the internet to the Environmental Engineering Section of the Office of Environmental Services. The flag noted above ("Not valid for SDWA compliance reporting") is not included. Consequently, there are two reports routinely sent to the Environmental Engineering Section: the paper "Water Bacteriological Report" which contains, when appropriate, the "Not valid for SDWA compliance reporting" qualification, and the electronic report in the MS Access database, sent via the internet, that does not contain the same qualification, when it should. It is the assessor's understanding that the Environmental Engineering Section only reviews the electronic report and not the paper report, which means the qualification indicated on the latter is never actually communicated to the Environmental Engineering Section. Based on conversations with lab personnel, it is clear that the database design is overdue for updating. Unfortunately, the database was developed by a contractor no longer under contract with the Environmental Engineering Section. Nonetheless, it may be possible for state IT personnel to update the MS Access database design. The database needs a comment field in which comments qualifying the results (such as, "Not valid for SDWA compliance reporting") could be placed. In addition, there are difficulties associated with correctly indicating in the database the reason for sample rejection and by whom the sample was collected. Updating the database design should be done with the input of those in the laboratory using the

database.

2. Both paragraph 6.3.1 and the Federal Register (40 CFR 141.21(f)(3) footnote 2), in regard to the collection of drinking water samples from distribution systems, state, "Systems are encouraged but not required to hold samples below 10°C during transit." Accordingly, it is recommended that distribution system samples be held below 10°C during transit and that this condition be documented through the use of a temperature blank, the temperature of which would be determined upon arrival at the Laboratory and recorded.

3. According to paragraph 3.4.1, incubator "thermometers should be placed on the top and bottom shelves of the use area". In the Laboratory's incubators, the two thermometers are on adjacent shelves. They should be on shelves well separated from one another (if not the top and bottom shelves) so as to provide a better representation of the incubator's internal temperature. The purpose of the greater spacing is to document that the air temperature is uniform throughout the inside of the incubator.

4. The record of autoclave maintenance is inadequate in that it only consists of a few lines recorded on a clip board kept in the lab. It is recommended that the Laboratory keep copies of the service technician's maintenance reports and a copy of the current autoclave maintenance contract in the autoclave laboratory.

5. Paragraph 5.1.6 lists the information concerning media preparation that should be recorded. It includes "lot number" and the results of checks with "positive and negative" control cultures. The current documentation of media preparation could be improved by recording manufacturer's lot number, and the results of a true negative control check. A negative control is a bacterial species that will not grow in the media or will not produce a positive result. A check for media sterility is an important QC item, but it is not the "negative control" check.

6. Currently, for each control check, a new IDEXX Quanti-cult preparation is used as the source of the control bacteria, and subsequently discarded. A stock culture (agar slant) is used as the source of *Proteus mirabilus*, a non-lactose fermenter; however, the purity of this culture is not periodically checked as recommended in paragraph 5.1.6.4. The Laboratory should perform this check periodically, record the results, and take corrective action if necessary.

7. The Laboratory should consider requiring the use of UV-absorbing safety glasses when laboratory personnel use the UV lamp to evaluate Colilert tests. Such safety glasses are currently not used.

8. According to paragraph 4.4.3 each lot of commercially-prepared dilution water should be checked for sterility. The Laboratory checks laboratory-prepared media and dilution water for sterility, but not commercially-prepared dilution water. Sterility checks of each new lot of commercially-prepared dilution water should be initiated and recorded.

E. General Comments:

1. The Laboratory has done an excellent job of updating, once again, the Water Bacteriological Report, incorporating all the requirements listed in paragraph 6.5 and many recommendations from prior on-sites evaluations. The report form serves to document and communicate key information. The updated form is a good example of the Laboratory's commitment to continuous improvement.

2. The Laboratory is also to be commended for the routine practice of rejecting samples (without analysis) for the reasons listed on the Water Bacteriological Report.

3. The Laboratory is to be further commended for the extensive QC performed and documented, much of which is done at a frequency greater than that required by the SDWA Manual.

F. Conclusions:

The Laboratory's management and staff are to be commended for their dedication to maintaining high standards in microbiological analysis and remaining committed to continual improvement. As shown in the table below, full certification will be recommended for Colilert (presence/absence and quantitative techniques), Multiple-Tube Fermentation, Membrane Filtration, and Heterotrophic Plate Count.

G. Certification Status (Recommended by the Certification Officer):

TECHNIQUE	METHOD[1]	CERTIFICATION STATUS
ONPG-MUG Test (Colilert - Presence/Absence)	SM 9223	Certified
ONPG-MUG Test (Colilert - Quantitative)	SM 9223	Certified
Fermentation	SM 9221B,E	Certified
Membrane Filtration	SM 9222B	Certified
Heterotrophic Plate Count	SM9215B	Certified

[1] *Standard Methods for the Examination of Water and Wastewater*, 20th Edition.

H. Assessor:

David E. Russell
Microbiological Assessor

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL SCIENCE CENTER
Analytical Services and Quality Assurance Branch
701 Mapes Road
Fort Meade, MD 20755-5350

December 20, 2006

Andrea M. Labik, Sc. D.
Director
West Virginia Department of Health & Human Resources
Bureau of Public Health
Office of Laboratory Services
167 - 11th Avenue
South Charleston, West Virginia 2503-1137

Dear Dr. Labik:

The final reports for the SDWA on-site assessment of your laboratory and WV's Laboratory Certification program were dated 10/24/06. The corrective action report from Larry Duffield, dated November 20, 2006 (additional materials received 12/7/06 for turbidity) addressed all remaining issues except for mercury and thallium. There were not corrective actions necessary for microbiology and the certification program as only suggestions were provided in the reports. Attached please find the certification update report for inorganic chemistry which reflects the provided corrective actions.

The analyses of SDWA compliance samples should not be performed for thallium using EPA 200.9 until another instrument is available. Also, compliance samples for mercury should not be analyzed until the necessary performance studies are complete and approved for the new instrument and a successful WS PT completed. As there may well be some delay regarding thallium and mercury, I am closing out this assessment. We will update certification for Hg and thallium when the necessary corrective actions are completed and documentation provided.

Sincerely,

Joseph Slayton
Technical Director

cc:
Wanda Johnson (3WP22)
Robert Lange (3WP32)
Charles Jones, Jr. (3EA00)
Robin Costas (3EA20)
George Long (3EA20)
David Russell (3EA20)

On-Site Laboratory Evaluation Update Report (SDWA)

Inorganic Chemistry

(Rev. 12-19-06 JS)

West Virginia Department of Health and Human Resources
Bureau for Public Health
Office of Laboratory Services
Environmental Chemistry Laboratory Section
4710 Chimney Drive, Suite G
Charleston, WV 25302

On-site: September 19-20, 2006

Surveyed by:

Robin Costas
George Long
Joseph Slayton

U.S.E.P.A. - Region III
Analytical Services and Quality Assurance Branch
701 Mapes Road
Ft. Meade, Maryland 20755-5350

Recommended Certification Status:

Based upon the corrective action report dated November 20, 2006 and December 7, 2006 from the September 19-20, 2006 SDWA on-site assessment, the assessment team recommends the following SDWA certification status for organic chemistry.:

LEGEND

C – Certified NA - Not Acceptable
AP – Approved
NP - Not Approved

CONTAMINANT	ON-SITE REVIEW	
		Method
Antimony	C	SM 3113B
Arsenic	C	SM 3113B
Barium	C	EPA200.7
Beryllium	C	SM 3113B
Cadmium	C	SM 3113B
Chromium	C	SM 3113B
Copper	C	SM 3113B
Copper	C	SM 3111B
Cyanide	C	SM 4500 CN F
Fluoride	C	EPA300.0
Lead	C	SM 3113B
Mercury	NC	EPA245.1
Nitrate	C	EPA353.2
Nitrite	C	EPA353.2
Selenium	C	SM 3113B
Thallium	NC	EPA200.9
Chloride	AP	EPA300.0

Sulfate	AP	EPA300.0
TDS	AP	SM2540C
Manganese	AP	SM 3111B
Nickel	AP	SM 3113B
Zinc	AP	SM 3111B
Aluminum	AP	SM 3113B
Iron	AP	SM 3111B
Silver	AP	SM 3113B

LEAD AND COPPER RULE:

CONTAMINANT	ON-SITE REVIEW 11/30/99	
		Method
Lead	C	SM3113B
Copper	C	SM3113B
Copper	C	SM 3111B
pH	C	EPA150.1
Conductivity	C	SM2510B
Calcium or Calcium Hardness as $CaCo_3$	C	SM3500 CAD
Alkalinity	C	SM2320B
Sodium	C	SM3111B
Turbidity	C	EPA180.1

Inspectors:

Robin Costas 12/19/06

George Long 12/19/06

Joseph Slayton 12/19/06

11.3 Attachment #3: Example On-site Pre-survey Package Template (General Information and Chemistry) rev. 6/20/06

State Laboratory SDWA Pre-Survey Package (Based on 5th ed. of "Lab Cert. Manual")

(Please complete electronically)

Date: August 1, 2006 Completed by (name/title): Thomas L. Ong

Only complete for Methods/Analytes for which the Laboratory seeks SDWA Certification

I. General Information:

A. Name of Laboratory: **West Virginia Department of Health & Human Resources**
Bureau For Public Health
OFFICE OF LABORATORY SERVICES

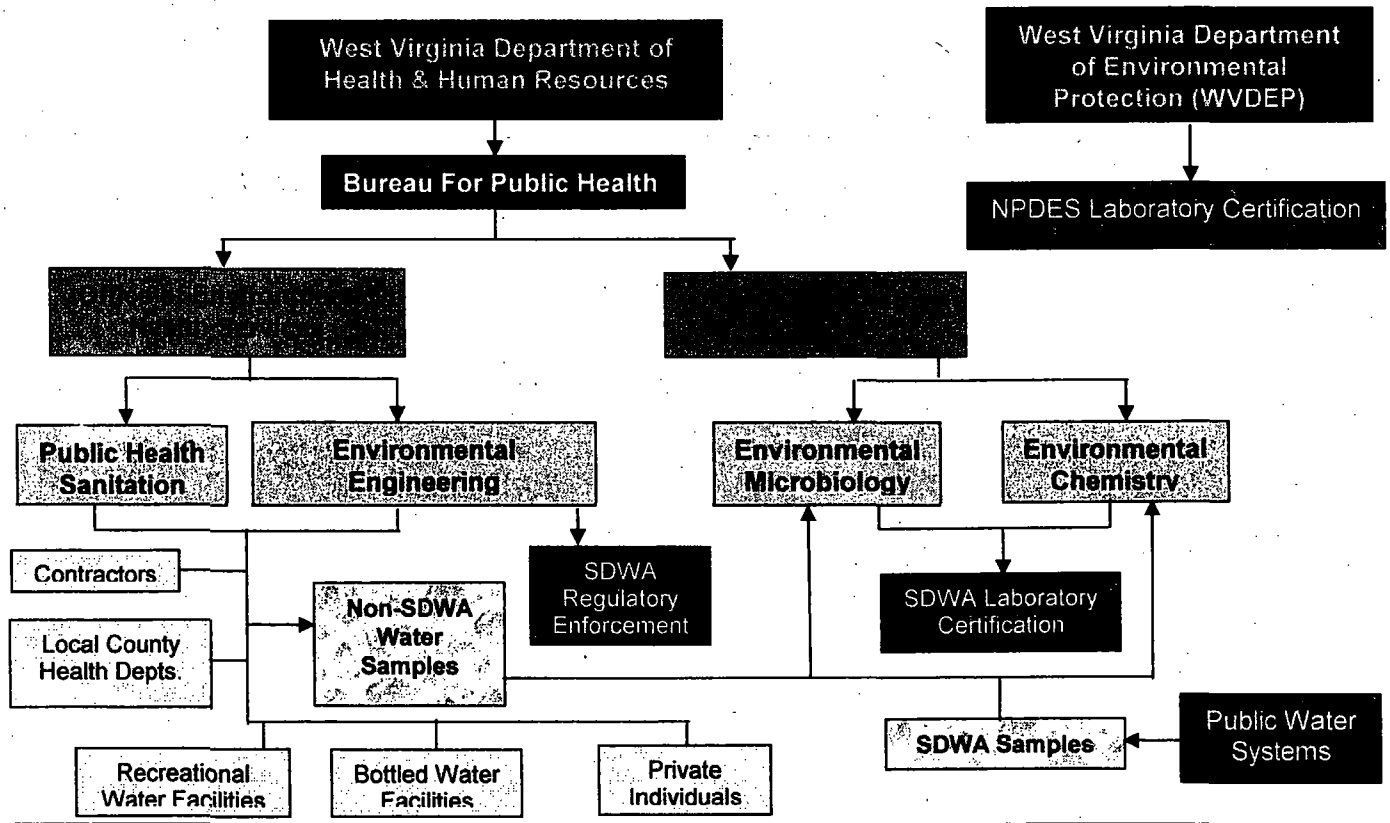
B. Address: 167 – 11th Avenue
South Charleston, WV 25303

C. Telephone Number: 304-558-3530

method ? breakdown next p. →

D. Name of Laboratory Director: Andrea Labik, Sc.D.

E. Provide an organizational chart of the laboratory, including any field operations or other internal affiliations to show how the laboratory fits into the general organizational structure.
Indicate SDWA and NPDES related portions of the laboratory organization.



F. List names of principal users of services of the laboratory.

1. Office of Environmental Health Services – Environmental Engineering Division
2. Office of Environmental Health Services – Public Health Sanitation
3. Public Water Systems
4. Bottled Water Facilities
5. Recreational Water Facilities
6. Local County Health Departments
7. Contractors
8. Private Individuals

G. List laboratory support provided by commercial laboratories, and other State or Federal laboratories

None

H. Indicate the approximate number of samples analyzed:

break down by method

	Microbiology		Chemical			
	Approximate Number of Samples/Year	*Approximate % of Laboratory Workload/Yr.	Approximate No. Samples/Year Organic/Inorganic		Approximate % of Lab.Workload/Yr. Organic/Inorganic	
SDWA	8,000	30%				
NPDES	0					
RCRA	0					
Superfund	0					
Other Monitoring	5,500	10%				

* 40% of laboratory work is involved with the Grade A Dairy Testing Program; 20% is involved with Drinking Water & Dairy Lab Certification

Please provide a listing of any codes used for Sample log-in which indicate the associated program:

SEE NEXT PAGE

WATER CODES

(Effective 7-1-2003)

Test Methods

Code	Method	Description/ Sample Volume	Method Reference
1	Membrane Filter Technique	100 mL	SM 9222 B
2	Multiple Tube Fermentation Technique	1 X 100 mL	SM 9221 B
3	Enzyme Substrate Test	Colilert (1 X 100 mL)	SM 9223 B
4	Membrane Filter Technique	Dilutions (< 100 mL)	SM 9222 B
5	Multiple Tube Fermentation Technique	Ten Tube Series (10 X 10 mL)	SM 9221 B/C
6	Multiple Tube Fermentation Technique	Dilutions (3 Tube Series: 10, 1.0, 0.1, etc.)	SM 9221 B/C
7	Enzyme Substrate Test	Colilert (Quanti Tray)	SM 9223 B
8	Enzyme Substrate Test	Colilert (Quanti Tray 2000)	SM 9223 B
9	Heterotrophic Plate Count	Pour Plate Method	SM 9215 B

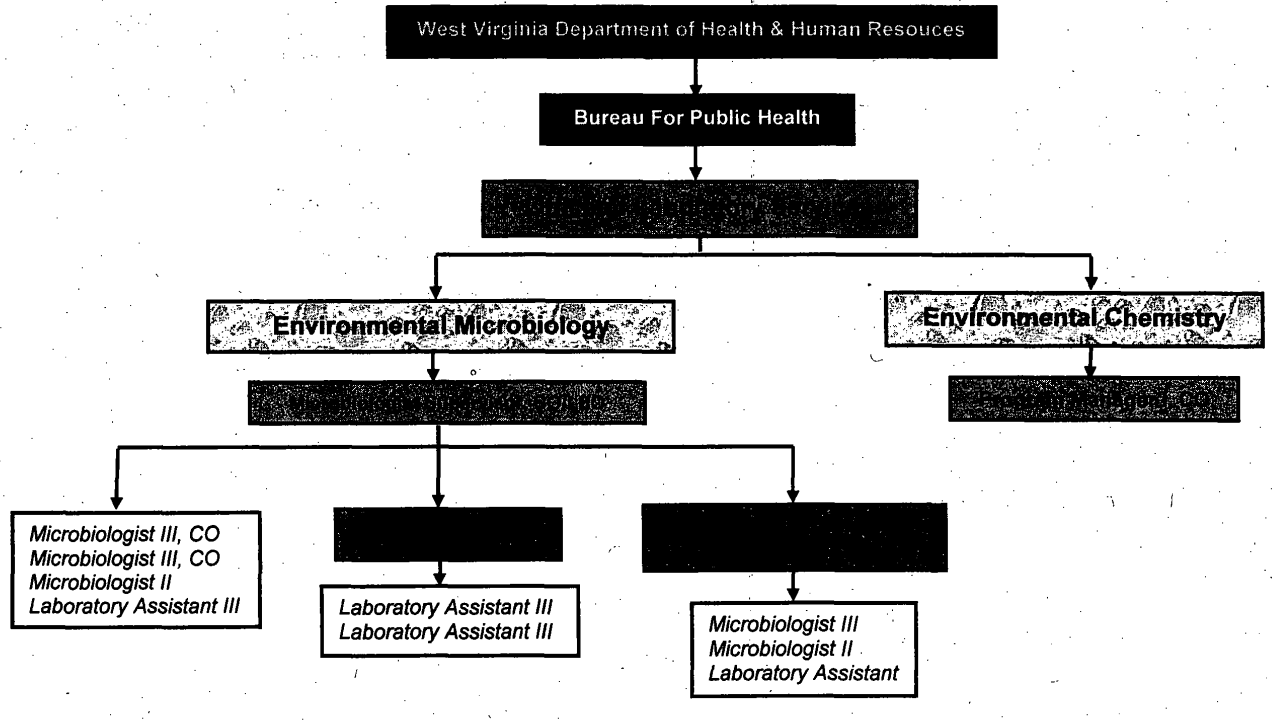
Sample Types

Code	Sample Type	Other	SDWIS
A	Public Waters		*
B	Privates		
C	Home Loans		
D	Swimming Pools/Hot Tubs		
E	Beaches		
F	Bottled Water/Ice		
G	Dairy Waters	Farms	
H	Dairy Waters	Plants	
I	Raw Waters	Surface and/or Surface-Ground Mix	*
J	Raw Waters	Ground	*
K	Raw Waters	Bottled Waters	
L	Sewage Suspects		
M	Disasters	Public Waters	*
N	Disasters	Private Wells	
O	Proficiency Tests	Multi Tube Fermentation	
P	Proficiency Tests	Enzyme Substrate (Colilert)	
Q	Proficiency Tests	Membrane Filter	

destinguished on sample collection form?

I. Personnel: Provide an organizational Chart which indicates how the Environmental Analyses Sections fit within the organization and how the lab fits in the larger Department/Bureau, etc.

Also , please complete this chart for all technical personnel, including the laboratory director. Use a separate block for each employee and arrange the presentation to reflect the lines of organizational responsibility for Chemistry and Microbiology.



Personnel (Cont.):

Name	Training		Position	Years of Experience		Identify Current Analyses Performed in Support of	
	Degree (Check One)	Major		Present Job	Previous Job	SDWA	NPDES
Andrea Labik	✓ Sc.D. MS BS/BA Assoc. HS		Laboratory Director	7 Years	3yrs, 9yrs		
Charlotte Billingsley	Ph.D. ✓ MS BS/BA Assoc. HS		Associate Director (Environmental)	13 years	23 years		
Thomas L. Ong	Ph.D. MS ✓ BS/BA Assoc. HS	Biology	Microbiologist Supervisor CO/LEO	10 Years	7 Years	SM9221B/E SM9223B SM9222B	
Mike Flesher ✓	Ph.D. ✓ M.P.H. ✓ BS/BA Assoc. HS	Public Health Biology	Microbiologist III CO	6 Years	7 Years	SM9221B/E SM9223B SM9222B	

Personnel (Cont.):

Name	Training		Position	Years of Experience		Identify Current Analyses Performed in Support of	
	Degree (Check One)	Major		Present Job	Previous Job	SDWA	NPDES
Tracy Goodson ✓	Ph.D. MS ✓ BS/BA Assoc. HS	Biology	Microbiologist III CO	3 Years	4 Years	SM9221B/E SM9223B SM9222B	
* Carole Moore ✓	Ph.D. MS ✓ BS/BA Assoc. HS	Biology	Microbiologist II	3 Years		SM9221B/E SM9223B SM9222B	
Deborah Peters ✓	Ph.D. MS BS/BA Assoc. ✓ HS		Laboratory Assistant III	7 Years		SM9221B/E SM9223B SM9222B	
	Ph.D. MS BS/BA Assoc. HS						

Fred Pantony ✓ - Medium Lab Assist III

Ron Releford - Medium " " "

* record of initial assessment is capability seen - OK ✓

Multi Tube Fermentation (100 mL)

I. Introduction -

Multi Tube Fermentation is the standard test used by the laboratory for detecting total coliform and fecal coliform bacteria in drinking water compliance samples. The historical definition for the coliform group of bacteria has been based on the method used for detection. When using the fermentation test, the coliform group of bacteria is defined as all facultative anaerobic, gram-negative, non-spore-forming, rod-shaped bacteria that ferment lactose with gas and acid formation within 48 hours at 35°C. For drinking water compliance samples the laboratory uses a single 100 mL sample portions and because of the potential problems associated with gas bubbles in large inverted tubes, the gas vials are replaced with bromcresol purple (0.01 g/L). The test consists of two phases - presumptive and confirmation and can take anywhere from 48 to 96 hours for completion.

II. Sample Requirements -

1. Maximum allowable elapsed time between sample collection and sample analysis is thirty (30) hours.

2. Reject samples for any of the following reasons:

   A. Sample exceeds 30 hours.
   B. Information on the Water Bacteriological Report Form (EM-1) is insufficient. (No date or time of collection)
   C. Insufficient Sample Volume. (< 97.5 mL)
   D. Sample contains residual chlorine.
   E. Insufficient air space to facilitate mixing of sample.
   F. Sample container was not furnished by the Office of Laboratory Services.

III. Sample Types -

1. Drinking water compliance samples ~~only~~.
2. Back-up method for all other drinking water samples and pools.

IV. Reagents and Equipment -

Reagents

1. Lauryl Tryptose Broth (double strength with 0.01 g/L Bromcresol Purple).

Prepared by the Media Preparation Section in 250 mL screw cap culture bottles (Corning or Wheaton) and stored in the dark in the cabinets in the water room for no longer than three months at room temperature (<30°C).

2. Brilliant Green Bile Broth. Prepared by the Media Preparation Section in 20 x 150 mm screw cap culture tubes and stored in the dark in the cabinets in the water room for no longer than three months (loose lid tubes stored no longer than 2 weeks) at room temperature (<30°C).

3. EC Medium. Prepared by the Media Preparation Section in 20 x 150 mm screw cap culture tubes and stored in the dark in the cabinets in the water room for no longer than three months (loose lid tubes stored no longer than 2 weeks) at room temperature.

Equipment

1. 35.0 ± 0.5°C Incubator. (Walk-In or Environette)
2. Sterile Cotton Swabs.
3. Metal Racks and Baskets.
4. Culture Tube Racks.
5. Wax "Chicken" Buckets.
6. Tare Bottle with 100.0 ± 2.5 mL range indicated.

For Quality Control

1. 10^{-8} Stock of *E. coli*
2. Slant of non-lactose fermentating *E. coli*
3. (3) 100 mL Sterile Water Samples.
4. Inoculating Loops

V. Procedure

Note: All data for the presumptive and confirmation phase is to be recorded on the MTF work sheet (Attachment #1) in the MTF Records Records Book.

Presumptive Phase

1. Shake sample 25 times in 7 seconds with a 1 foot movement and pour off excess so that only 100 ± 2.5 mL remains. (Use tare bottle.)

2. Pour 100 mL of sample into culture bottle containing 100 mL of double strength lauryl tryptose broth containing bromcresol purple.

3. Place inoculated culture bottle(s) into metal rack (holds 30 samples) or metal basket (holds 6-7 samples) and place in a 35.0 ± 0.5°C incubator (Walk-In or Environette) for 48 ± 3 hours on the 24 hour shelf.

4. Check cultures in 24 ± 2 hours. If culture(s) are clear purple (negative) or cloudy purple (Turbid), move to the 48 hour shelf. If culture(s) are yellow (Presumptive Positive), remove from the incubator and obtain the corresponding Water Bacteriological Report Form (EM-1). Record a "+1" in the "p/a24" column. Place the corresponding Water Bacteriological Report Form, EM-1 into the 24 Hour BG box. The sample is now ready for the Confirmation Phase.

5. After 48 ± 3 hours of incubation, remove remaining cultures from the incubator. Cultures that are clear purple are negative for total coliform bacteria. For the negative cultures, record the date they are read in the "rpt date" column and the analysts initial's in the "init" column. Also, record the time read out to the side of the last column. Note, the report date and initials can be recorded in the top of the column and lines drawn down. The sample is now ready for reporting.

   If a culture is cloudy purple (turbid), set it aside, locate the corresponding EM-1 form and place it in the 24 Hour BG box and record a "T" in the "P/A48" column. The sample is now ready for the Confirmation Phase.

   If a culture is yellow, set it aside, locate the corresponding EM-1 form and place it in the 24 Hour BG box and record a "+1" in the "P/A48" column. The sample is now ready for the Confirmation Phase.

   Confirmation Phase

6. For each presumptive positive sample (yellow and turbid cultures) submitted for the Confirmation Phase, obtain one tube containing EC Medium (EC) and one tube containing Brilliant Green Bile Broth (BG). Label each tube with the laboratory number as follows: using a wax pencil, label the glass BG tube with the sample number and label metal lid of the EC tube with the laboratory number. (The lid of the EC tube is numbered because the tube is placed in a water bath and if the glass tube is numbered, it may wash off.)

7. Mix the presumptive positive culture by swirling it. Using a sterile swab, dip into

the presumptive positive culture and then transfer into EC and then into BG (in that order). Record the time of the transfer in sample log book at the bottom of the appropriate column (p/a24 or P/A48).

8. Place the BG tube on the 24 Hour BG shelf in the 35.0 ± 0.5°C Walk-In Incubator and place the EC tube in the 44.5 ± 0.2°C Fecal Water Bath.

9. After 24 ± 2 hours remove the EC tubes from the Fecal Water Bath and gently swirl to dislodge any gas bubbles. Gas in the inverted gas vial is considered a fecal coliform positive and is to be recored as a "+1" in the "fc data" column. Clear tubes with no gas and turbid tubes with no gas are considered negative for fecal coliform and are to be recorded as "-1" in the "fc data" column. Fecal coliform positive samples are to recorded as "Pres" in the "fecal rp" column.

10. After 24 ± 2 hours the BG tubes are to be removed from the 24 Hour BG shelf and examined for gas production. If there is no gas in the inverted vial, record as "-1" in the "conf/c" column and place back into the Walk-In Incubator on the 48 Hour BG shelf for another 24 hours (total time in BG is 48 ± 3 hours). Place corresponding EM-1 form into the 48 Hour BG Box.

    If there is gas in the inverted gas vial then the sample is confirmed as total coliform positive. Record a "+1" in the "conf/c" column and "Pres" in the "total" column. Record the report date in the "rpt date" column and analysts initials in the "init" column. Also, record the time to the right of the "init" column. The sample is now ready for reporting.

11. After 48 ± 3 hours, remove all BG tubes from the Walk-In and examine for gas production. If there is gas in the inverted gas vial, then the sample is confirmed as total coliform positive. Record a "+1" in the "conf/48" column and "Pres" in the "total" column. Record the report date in the "rpt date" column and analysts initials in the "init" column. Also, record the time to the right of the "init" column. The sample is now ready for reporting.

    If there is no gas in the inverted gas vial, then the sample is considered Invalid. record a "-1" in the "conf/c" column and "Inv" in the "total" column. Record the report date in the "rpt date" column and analysts initials in the "init" column. Also, record the time to the right of the "init" column. The sample is now ready for reporting.

Reporting

12. After analysis is complete and the data is recorded in the log book, the corresponding EM-1 forms must be completed. For samples that are negative for total coliform, record an "X" in the in the "Total Coliform Absent" Box on the EM-1 form.

    For samples that are total coliform positive, record and "X" in the "Total Coliform Present" Box on the EM-1 form. Then record the fecal coliform results by placing an "X" in the appropriate "Fecal Coliform" Box (either Present or Absent). If a sample is "Present" for total coliform, then there must be a result for fecal coliform.

    For invalid samples, those that did not produce gas within 48 ± 3 hours in Brilliant Green Bile broth, place an "X" in the "Invalid" box, an "X" in the "Turbid" box and an "X" by the "Send Replacement Sample"

13. After all EM-1 forms are marked, they are to be placed in the "To Be Checked" Basket.

14. A Microbiologist II or higher then will check the EM-1 forms against the log book for precision and accuracy and will initial all total coliform positive results in the log book to the right of the last column.

15. If a sample is submitted for compliance with the Safe Drinking Water Act (SDWA) and is positive for total coliforms, the EM-1 form is pulled by the analyst checking the forms and marked with a "post-it"note indicating that it is to be faxed to the Office of Environmental Health Services - Environmental Engineering Division. These forms are immediately faxed by the staff of the General Reporting Office.

16. All EM-1 forms are then taken to the General Reporting Office where they are sorted, faxed, mailed and stored.

VI. Quality Control

Each batch of laboratory prepared media must be checked before use with positive and negative controls.

1. When media is delivered from the Media & Glassware Preparation Unit, pull 4 samples from each batch (double strength lauryl tryptose broth, brilliant green bile broth and EC Medium).

2. Label as follows: 1 bottle/tube "-" (Negative Control), 1 bottle/tube "NLF" (non-lactose fermenting E. coli) and 2 bottles/tubes "+" (Positive Control - *E. coli*).

For 100 mL Double Strength Lauryl Tryptose Broth:

3. Obtain four 99 mL dilution blanks per batch. Label as in Step #2. Add nothing to the "-" dilution blank, add one loopful of NLF (from a slant) to the dilution blank labeled "NLF" and add 0.5 mL of 10^{-8} stock of *E. coli* to each dilution blank labeled "+".

4. Shake each dilution blank and add to the appropriate labeled culture bottle and incubate as outlined in the procedure above above.

5. Record Results on QC Form (Attechment #2).

For Brilliant Green Bile Broth and EC Medium:

6. Add 0.5 mL of 10-8 stock culture of E. coli to tubes labeled "+", add a loopful of non-lactose fermentating *E. coli* to the tube labeled "NLF" and add nothing to the tube labeled "-".

7. Incubate as outlined in the procedure in Section V above.

8. Record results on QC Form (Attachment #2).

Attachment #1
MTF Bench Sheet

Attachment #2
Media Productivity and Sterility Checks

Membrane Filtration - Total Coliforms (100 mL)

I. Introduction -

Membrane Filter Technique is a method used for detecting coliform bacteria in wide variety of water sample types. It is based on passing a volume of water through a 0.45µm "membrane" filter to "catch" the coliform bacteria and then incubating the filter on the appropriate media. When using this method, coliform bacteria is defined as facultative anaerobic, gram-negative, non-spore-forming, rod-shaped bacteria that develop red colonies with a metallic (golden) sheen within 24 hours at 35°C on an Endo-type medium containing lactose. Some of the coliform colonies may appear as dark red, mucoid or nucleated without a metallic sheen.

Currently, the laboratory is not utilizing this method for compliance samples. The method is used only as a back-up to Multi Tube Fermentation Method and the Chromogenic/Fluorogenic Substrate Test (Colilert).

II. Sample Requirements -

1. Maximum allowable elapsed time between sample collection and analysis is 30 hours.

2. Sample must be chlorinated.

3. Sample must be from a public water system that has a P.W.S. I.D.# beginning with "330".

4. Samples are to be rejected for any of the following reasons:

   A. Insufficient air space to facilitate mixing.
   B. Sample contains residual chlorine.
   C. Sample exceeds maximum allowable time requirements.
   D. Information on the Water Bacteriological Report Form (EM-1) is insufficient. (No date or time of collection)
   E. Insufficient sample volume (< 97.5 mL).
   F. Sample container was not furnished by the Office of Laboratory Services.

III. Sample Types -

This method is not currently in use at the laboratory. However, since the Environmental

Microbiology Section is the drinking water Certification Authority for the state and membrane filter is a method that is being used in other state certified laboratories, the Environmental Microbiology Section is maintaining this method as a certified procedure. This method will only be used as a back-up to Multi Tube Fermentation and Chromogenic/Fluorogenic Substrate Methods.

1. Public drinking water samples that meet the requirements listed in Section II above.

IV. Reagents and Equipment -

Reagents:

1. m-Endo LES Agar
2. Brilliant Green Bile Broth 2%
3. Lauryl Tryptose Broth
4. EC Medium
5. 95% EtOH (not denatured)
6. Sterile, Buffered Rinse Water

Equipment:

1. Vacuum Pump
2. 2 Vacuum Flasks
3. Filtration units (autoclavable plastic, magnetic consisting of funnel and base)
4. 0.45 µm membrane filters
5. Petri Dishes (15 X 60 mm, loose lid)
6. Forceps (non-corrugated tips)
7. Rinse Bottles
8. Sealable Plastic Container 12" X 8.5" X 5.5" (LxWxH)
9. Cheese Cloth
10. Wax Buckets
11. 1 oz. Nalgene Bottle
12. Permanent Marker
13. 10X Stereo Scope
14. Fluorescent Light Source
15. Sterile Cotton Swabs

V. Procedure -

Set-Up -

1. Cut a piece of cheese cloth, wet with tap water and wring out so that it remains damp. Place this in the sealable plastic container and place on the table in the 35.0 ± 0.5°C Walk-In Incubator. Size of the cheese cloth varies, depending upon the number of samples. The cheese cloth should be long enough to set the stacked petri dishes on and still have enough to fold over the stack of petri dishes.

2. Rinse bottles are stored with about 1" of 70% EtOH in them to keep the bacterial growth down. Pour the EtOH from the rinse bottle into the glass stoppered bottle. Pour an inch or two of rinse water into the rinse bottle, cap, shake and squeeze the rinse bottle into a wax bucket to remove the EtOH residue, then pour the remaining rinse water from the rinse bottle into the wax bucket. Fill the rinse bottle to the fill line with rinse water. Just prior to analyzing the samples, dip the tip of the rinse bottle into the EtOH in the glass-stoppered bottle (tilting the glass-stoppered bottle so that the tip of the rinse bottle is submerged in the EtOH). Squeeze the rinse bottle to expel rinse water into the wax bucket to rinse the EtOH from the tip.

3. m-Endo LES agar is prepared by the Media and Glassware Preparation Unit and is stored in sealed plastic container in the Walk-In refrigerator in the Milk Room for no longer than 2 weeks. Obtain the appropriate number of m-Endo LES agar petri dishes. One plate for each sample plus five control plates plus a rinse plate for every 11 samples. Label the plates with a permanent marker (Sharpie®) on the lid (do not label the bottom of the plate containing the agar). Label the plates as follows:

"Media"	This is the media control and is incubated as is.
"Filter"	This plate contains only a sterile filter and is used as the filter sterility control. A sterile filter is removed from the package and placed directly onto the m-Endo LES agar.
"Pre"	This plate is used to check the sterility of the filtration apparatus (funnels). A sterile filter is placed on the base and the magnetic funnel is attached. About 20 - 30 mL of sterile rinse water from the rinse bottle is added to the funnel and then the vacuum is turned on. The funnel is rinsed with 3 over-lapping rinses then the filter is place on the m-Endo LES Agar in the "Pre" petri dish.
"Post"	Same procedure as the "Pre", only this is done after the last

sample.

"Sample # R" Same procedure as the "Pre" and "Post". This plate is done after every 11 samples to ensure there is no "carry-over" occurring. (This is done after the 8th sample on the first run only.)

"+" Control The very last plate. The filtration apparatus is filled with 20 - 30 mL of Rinse Water and 0.5 mL from a stock culture of *E. coli* is added then filtered.

"Sampel #" Label this plate with just the sample number.

4. Unwrap the pre-sterilized filtration apparatus being careful not to touch the inside of the funnel or the top of the base where the filter sets.

5. Have a bunsen burner turned on and the forceps placed in the 1 oz nalgene bottle with 95% EtOH.

6. Place the base of the filtration apparatus in the vacuum funnel.

7. Carefully remove a sterile filter by pealing the cover back from the corner while slightly bending the filter (this helps separate the blue top and bottom cover of the filter). Flame the forceps and remove the filter from the pouch (using the flamed forceps) and place it on the filtration apparatus' base, grid side up. Place the forceps back into the 1 oz nalgene bottle containing EtOH and place the magnetic funnel top onto the base.

Sample Analysis -

1. Run the "Media", "Filter" and "Pre" controls listed in "Set-Up" Item #3. Sterile filters are placed on the base of the filtration apparatus before each sample or control plate is done using the technique described in "Set-Up, Item #7". Filters are removed by removing the magnetic funnel (top), shaking off the excess water, and lying it on it's side on a ring clamp or paper towel (careful not to touch the bottom or the inside). Turn off the vacuum by turning the valve on the rubber tubing that leads to the vacuum flask. Flame the forceps and use them to slowly "peal-off" the filter from the base. Using a "rocking motion", place the filter on the surface of the m-Endo LES agar. Ensure that the filter is flat on the agar surface and that there are no air bubbles within the filtration area of the filter.

2. With the filtration apparatus set up and a sterile filter in place, shake the sample 25 times in 7 seconds with a 1 foot movement. Pour the sample into the funnel up to the 100 mL indicator mark.

3. Turn on the vacuum by turning the valve on the rubber tube that leads to the vacuum flask. The 100 mL of sample will then be pulled (filtered) through the 0.45 µm filter.

4. After the sample has been completely filtered, rinse the funnel 3 times with the rinse bottle. The stream of rinse water should be kept high on the funnel (at least 1" form the top). Each rinse must be overlapping, approximately 450° (Start the rinsing stream at one point on the funnel and continue in a circular motion back to the starting point and then about a quarter of a turn more). Let each rinse completely drain before starting the next.

5. Remove the filter as described in "Sample Analysis, Item #1" and place it in the appropriately labeled petri dish.

6. After the 8th sample on the first run and every 11 samples thereafter, a rinse is performed by filtering only rinse water from the rinse bottle as described in "Set-Up, Item #3, "Pre".

7. Plates must be put in the incubator within 10 minutes of placing a filter on them. Plates are stacked 6 high. When a stack of 6 is complete, place them upside down on the moist cheese cloth in the tight sealing plastic container in the "Walk-In" Incubator.

8. After the last sample is filtered, a "Post Rinse" is done. It is the same procedure as any other rinse with the exception that it is the last one.

9. After the post rinse, if nothing else is to be analyzed, a positive control is done. The procedure is the same as a rinse with the exception that 0.5 mL of a stock culture of *E. coli* is pipetted into the 20 - 30 mL of rinse water before the vacuum is turned on.

10. The follow represents how plates would be labeled and stacked in the incubator for samples numbering from 560 to 586:

562	567 R	573	578 R	584	
561	567	572	578	583	
560	566	571	577	582	"+Control"
"Pre"	565	570	576	581	"Post"
"Filter"	564	569	575	580	586
"Media"	563	568	574	579	585

11. After the last stack is placed in the incubator, the moist cheese cloth is unfolded over the plates and the lid is sealed on the container. A strip of making tape is placed on the lid and labeled with the Date, Time and Analysts Initials. The container is then placed on one of the shelves containing a thermometer for 22 to 24 hours.

Reading and Interpreting -

1. After 22 - 24 hours at 35.0 ± 0.5°C remove the container and examine the petri dishes under the stereo scope (10X magnification) with the petri dished tilted towards the fluorescent light source.

2. Record counts as follows:

Observation	Record	Action
No colonies appear	Record count as "0"	Report as Total Coliform Absesnt (< 1)
Metallic green or dark red colonies appear	Count and record the total number of colonies. If >200 appear, record as "TNTC". If the growth of bacteria is a sold mass, report as "Confluent Growth"	These are suspect for coliform bacteria and must be subject to the verification procedure

Observation	Record	Action
Red colonies appear	Count and record number of colonies. If >200 appear, record as "TNTC". If the growth of bacteria is a sold mass, report as "Confluent Growth"	These may be atypical coliform colonies and must be subject to the verification phase.
Light Pink or Clear colonies appear	If < 200, record count as "0" If > 200, report as "TNTC"	< 200 report as Total Coliforms Absent. If >200, Report as "Invalid - TNTC". These may be subjected to the verification phase.
Foreign Matter appears on the filter (iron, dirt, grit or sand, etc.)	Record as "Particulate Matter"	Report as "Invalid - Particulate Matter". May be submitted to the verification phase.

Verification -

1. Obtain the plates that are subject to the verification phase (listed in the table above). Each plate requires one tube of EC Medium (EC), one tube of Single Lauryl (SL) and one tube of Brilliant Green Bile Broth (BG). For the SL and BG tube, label the glass tube with the sample number using a wax pencil. For the EC tube, label the metal lid with the sample number using a wax pencil.

2. Aseptically remove a sterile swab from the glass containers, careful not to drag the cotton tips over the exposed ends.

3. Using the sterile swab, wipe the entire surface of the filter, removing all of the growth. Since the test is based on a "Presence/Absence" concept, picking individual colonies is not necessary. If counts were to be reported, then individual colonies would have to be picked.

4. Innoculate a tube of EC, SL and BG (in that order).

5. Place the SL and BG tubes in the 35.0°C Walk-In Incubator for 48 ± 3 hours (checking for gas production in 24 ± 2 hours) and the EC tube in the 44.5°C Fecal

Bath for 24 ± 2 hours.

6. Gas Production in the BG tube verifies the presence of Total Coliform Bacteria. Gas Production in the EC tube verifies the presence of Fecal Coliform Bacteria. If gas is produced in the SL and not the BG or EC, then using a sterile swab, re-innoculate a BG and EC tube. Gas in the EC tube but not the BG tube is still considered Total Coliform Positive (this is extremely rare). No gas production in any of the tubes does not rule out the presence of coliform bacteria. See the "Reporting" Section

Reporting -

Original Observation	Verification Result	Report
<200 Metallic Green and/or Dark Red Colonies	Gas Production in BG Gas Production in EC No Gas Production in BG No Gas Production in EC	Total Coliform Present Fecal Coliform Present Total Coliform Absent Fecal Coliform Absent
>200 Metallic Green and/or Dark Red Colonies	Gas Production in BG Gas Production in EC No Gas Production in BG No Gas Production in EC	Total Coliform Present Fecal Coliform Present Invalid - TNTC Invalid - TNTC unless Gas Production in BG, then Total Coliform Present, Fecal Coliform Absent
< 200 Red Colonies	Gas Production in BG Gas Production in EC No Gas Production in BG No Gas Production in EC	Total Coliform Present Fecal Coliform Present Total Coliform Absent Fecal Coliform Absent
> 200 Red Colonies	Gas Production in BG Gas Production in EC No Gas Production in BG No Gas Production in EC	Total Coliform Present Fecal Coliform Present Invalid - TNTC Invalid - TNTC unless Gas Production in BG, then Total Coliform Present, Fecal Coliform Absent

Original Observation	Verification Result	Report
> 200 Clear or Pink Colonies	Gas Production in BG Gas Production in EC No Gas Production in BG No Gas Production in EC	Total Coliform Present Fecal Coliform Present Invalid - TNTC Invalid - TNTC unless Gas Production in BG, then Total Coliform Present, Fecal Coliform Absent
Foreign Matter appears on the filter (iron, dirt, grit or sand, etc.)	Gas Production in BG Gas Production in EC No Gas Production in BG No Gas Production in EC	Total Coliform Present Fecal Coliform Present Invalid - TNTC Invalid - TNTC unless Gas Production in BG, then Total Coliform Present, Fecal Coliform Absent

VI. Quality Control

1. If any of the control plates show signs of contamination ("Media", "Filter", "Pre", "Post" or any "Rinse"), the affected samples are to be reported as "Laboratory Accident" and replacements samples are requested.

2. Lot Numbers of filters are recorded when received and put into use. (Attachment #1)

3. Monthly, 2 to 3 analysts count the same membrane (containing 20 to 80 colonies). Counts must agree within 10%. (Attachment #1)

4. Monthly, an *E. coli* positive sample is taken through the verification phase. (Attachment #1)

Chromogenic/Fluorogenic Substrate Test (Colilert 100 mL)

I. Introduction -

Colilert Reagent is used for the simultaneous detection and conformation of total coliforms and *E. coli* in water, which is based on the Defined Substrate Technology (DST). DST utilizes indicator-nutrient which cause target microbes contained in the sample and incubated in the DST reagent system to produce a color change (or another signal i.e., fluorescence), both indicating and confirming their presence.

II. Sample Requirements-

1. For Compliance Samples: Maximum allowable elapsed time between sample collection and sample analysis is thirty (30) hours.

   For Non-Compliance: Maximum allowable elapsed time between sample collection and sample analysis is forty eight (48) hours.

2. Reject samples for any of the following reasons:

   A. Insufficient air space to facilitate mixing of sample.
   B. Sample contains residual chlorine. (Blue flash appears)
   C. Sample exceeds maximum allowable time requirements.
   D. Information on the Water Bacteriological Report Form (EM-1) is insufficient. (No date or time of collection)
   E. Sample container was not furnished by the Office of Laboratory Services.
   F. Insufficient Sample Volume. (< 97.5 mL)

III. Sample Types -

1. Repeat/Replacement Samples
2. Special Purpose Samples
3. Private Samples
4. Home Loans
5. Bottled Waters
6. Swimming Pools
7. Flood/Disaster Samples

IV. Reagents and Equipment -

1. 35.0° ± 0.5°C Incubator. (Walk-In or Environette)
2. Long wavelength (366 nm) Ultraviolet Lamp.
3. Color and fluorescence comparator.
4. Clear, sterile, non-fluorescent 120 mL bottle. (Graduated at the 100 mL mark)
5. Colilert Reagent.
6. 70% Ethanol

For Quality Control:

1. Inoculating loop.
2. Nutrient Agar Slants of the following organisms:
   A. *Pseudomonas aeruginosa*
   B. *Klebsiella pneumoniae*
   C. *E. coli*
3. Tryptic Soy Broth. (TSB)

V. Procedure -

1. Sanitize area with 70% Ethanol and wash hands.

2. Aseptically, add Colilert Reagent to appropriate test bottles (See Item IV - 4). One packet of reagent per test bottle. An estimated number of bottles may be prepared in advance (first thing in the morning) in anticipation of the daily work load. Prepared bottles must be used within 30 hours and stored in the dark (if not used the day they are prepared).

3. Shake sample 25 times within seven (7) seconds with a one (1) foot movement.

4. If the sample is originally in an opaque nalgene bottle, remove the laboratory number sticker and place it on the lid of the test bottle. Remove the sample bottle lid and discard it into a wax bucket. Remove the test bottle lid and while holding it with one hand (do not lay the lid on the table or touch the inside), pour the sample into the test bottle up to the 100 mL line and replace the lid

   Or

   If the sample arrives already in one of the test bottles, remove the lid (do not lay the lid down - hold the lid in the same hand that holds the pipet bulb) and using a

sterile 10 mL pipet, remove and discard excess sample (down to the 100 mL mark), set lid back on test bottle. Raise the lid and aseptically add a packet of colilert reagent.

5. Shake test bottles until colilert reagent dissolves and place in metal basket. Metal baskets will hold 15 test bottles. When metal basket is full or all samples are done (if < 15 samples), write the date and time on a piece of masking tape, place it on the basket and place the basket in the 35.0°C incubator (Walk-In).

6 Incubate samples for 24-28 hours at 35.0±0.5°C.

Test Results

1. Remove samples from the incubator after 24 hours incubation. Samples must be removed from the incubator with 28 hours.

2 Examine samples for the presence of a yellow color (confirming the presence of coliform bacteria) that is equal to or greater than the compartor. Samples that are slightly yellow, but not as yellow as the comparator, must be place back into the incubator to incubate for the full 28 hours. Samples left in the incubator for more than 28 hours must be reported as "Laboratory Accident" unless they are clear.

3. If a sample has a yellow color equal to or greater than the comparator, then a +1 is to be recorded in the "CONF/COLI" column and a "P" in the "Total" column of the colilert bench sheet. The sample is considered "Total Coliform Positive".

4. All Yellow Samples (Total Coliform Positive Samples) must be taken into the Walk-In Incubator and checked for fluorescence with the 366 nm UV light. Samples with fluoresce equal to or greater than the comparator are Positive for *E. coli* and must be marked on the lab number label with a pen or marker. The samples that fluoresce must then be marked with a +1 in the "EC/FC24" column and a "P" in the "ECOLI" column on the colilert bench sheet. If the sample did not fluoresce, then it must then be marked with a -1 in the "EC/FC24" column and an "A" in the "ECOLI" column on the colilert bench sheet.

5. If a sample is clear (Negative for Total Coliforms) then record on the bench sheet the date that the sample analysis was completed in the "RPT DATE" column and the analysts initials (analyst reading the results) in the "INT" column.

Note: The report date and analysts initials may be recorded on the top line and

then arrows drawn down. See example on Attachment #1.

6. After the data has been entered on the bench sheet for a particular sample then the Water Bacteriological Report Form (EM-1) is to be completed. Total Coliforms are to be marked as "Present" or "Absent". *E. coli* only has to be marked as "Present" or "Absent" if Total Coliforms are Present.

7. After all EM-1 forms are marked, they are to be placed in the basket labeled "Forms To Be Checked".

8. All forms are to be checked by a Microbiologist II or higher. All samples with Total Coliform Positive Results must be initialed by the analyst checking them on the bench sheet. Initials are to be placed to the right of the initials of the analyst reading the test. (See Attachment #1).

VI. Quality Control

Test Bottles -

1. Each lot of Colilert Test Bottles received must be checked. (See Attachment #2)

2. Record the "Date of Check" and the "Lot Number" on the "Quality Control - Colilert Bottles" Form in the Water QC Book.

3. Check three (3) bottles from each lot for sterility by adding 25 mL of Tryptic Soy Broth to each bottle, incubate at 35.0 ± 0.5°C for 24 hours. After the 24 hours, examine bottles for signs of growth (Turbidity). Record results in the "Sterility" Column as "Number of Bottles", "A" (Absent-No-growth) or "P" (Positive - Turbid). If any bottles test Positive, recheck three (3) more bottles. If any bottles on the recheck test positive, contact the Supervisor.

4. Verify the 100 mL mark on one (1) bottle from each lot by filling the bottle to the 100 mL mark with water then pour into a Class A graduated cylinder. If volume reads 100 ± 2.5 mL, place a "✓" in the "100 mL" Column (the 100 mL mark can be used to measure the sample volume); if the volume reads outside of the 100 ± 2.5 mL range, place an "X" in the column (the 100 mL mark cannot be used to measure the sample volume).

5. Check one (1) bottle from each lot (can be the same bottle that is used for the volume check) for autofluorescence by examining the bottle in the dark in the

Walk-In Incubator with the 366 nm UV light. Place a "✓" in the "Autofluorescence" column if the bottle does not fluoresce and an "X" if it fluoresces. If the bottle fluoresces, then check another from the same lot. If the recheck fluoresces, contact the Supervisor.

For Colilert Reagent -

1. Each lot of Colilert Reagent must be checked before use with controls. (See Attachment #3)

2. Record "Date Received", "Date Tested" and "Lot Number" on "MMO-MUG Quality Control" Form.

3. Aseptically add one (1) packet of colilert reagent to 100 mL of sterile water in a colilert test bottle and shake to dissolve completely.

4. Divide into thirds using two (2) more colilert test bottles.

5. Label the first bottle "Pseudo", the second bottle "Kleb." and the third bottle "*E. coli.*

6. Obtain 18 to 24 hour old nutrient agar slants of *Pseudomonas aeruginosa, Klebsiella pneumoniae* and *E. coli.*

7. Using a sterile inoculating loop touch the surface of one of the nutrient agar slants and then inoculate the appropriate colilert test bottle. Repeat for the two (2) remaining nutrient agar slants.

8. Incubate test bottles at 35.0 ± 0.5° for 24 to 28 hours.

9. Record results on the "MMO-MUG Quality Control" form using the following codes: "-" = No Color; "+" = Yellow Color; "+F" = Fluorescence; and "-F"= No Fluorescence.

   Note: Results should be as follows:

   Pseudomonas = "-"
   Klebsiella = "+, -F"
   E. coli = "+, +F"

If results do not match above, retest. If retest does not match above results, contact Supervisor.

10. Record initials in the "Analyst" column when recording the results.

Joe S's Ex Sum.

Checklist for QA Plan :

From Section 11. Laboratory Quality Assurance Plan of the Manual for the Certification of Laboratories Analyzing Drinking Water 5th Edition, EPA 815-R-05-004, January 2005

All laboratories analyzing drinking water compliance samples must adhere to any required QC procedures specified in the methods. This is to ensure that routinely generated analytical data are scientifically valid and defensible, and are of known and acceptable precision and accuracy. To accomplish these goals, each laboratory should (EPA Order 5360.1 A2) prepare a written description of its QA activities (a QA plan). It is the responsibility of the QA manager to keep the QA plan up to date. All laboratory personnel need to be familiar with the contents of the QA plan. This plan should be submitted to the auditors for review prior to the on-site visit or should be reviewed as part of the on-site visit.
The laboratory QA plan should be a separately prepared text. However, documentation for many of the listed QA plan items may be made by reference to appropriate sections of this manual, the laboratory's standard operating procedures, (SOPs) or other literature (e.g., promulgated methods, *Standard Methods for the Examination of Water and Wastewater*, etc.). The QA Plan should be updated at least annually (EPA Order 5360.1 A2).

At a minimum, the following items should be addressed in each QA plan:

Place a ✓ next to items found in Lab's "Quality Manual":

11.1 Laboratory organization and responsibility

Note: this is a combined (chemistry & microbiology)

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and
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- include a chart or table showing the laboratory organization and lines of responsibility, including QA managers; **✓ Attachment A (needs to be updated to show personnel changes, e.g., Joe Cochran)**
- list the key individuals who are responsible for ensuring the production of valid measurements and the routine assessment of measurement systems for precision and accuracy (e.g., who is responsible for internal audits and reviews of the implementation of the plan and its requirements) **✓ Section II lists responsibilities for QA Plan**;
- reference the job descriptions of the personnel and describe training to keep personnel updated on regulations and methodology, and document that laboratory personnel have demonstrated proficiency for the methods they perform **✓ Attachment B lists the job descriptions**.

11.2 Process used to identify clients' Data Quality Objectives ? **Not specifically addressed, though the many forms for samplers and reports are specific for different customers. Attachment Section P (Acronyms and Definitions of Terms does include "Data Quality Objectives: Qualitative and quantitative specifications used to design a study that will limit**

uncertainty to an acceptable level."

11.3 SOPs with dates of last revision **Attachment C is a listing of SOPs complete with DCN SOPMET0100-1200 but does not list the effective date or date of last revision.**

- The laboratory should maintain SOPs that accurately reflect all phases of current laboratory activities
- keep a list of SOPs✓ **Attachment C, List of SOPs**
- ensure that current copies of SOPs are in the laboratory and in the QA Managers files; ✓ **Section III G.5, Technical Procedures, page 9 body of document-- specifies in the laboratory work area.**
- ensure that SOPs are **reviewed annually** and revised as changes are made; **Not specified.**
- ensure that SOPs have signature pages and revisions dated. ✓ **(Chemistry—need to check microbiology)**

11.4 Field sampling procedures

- describe the process used to identify sample collectors, sampling procedures and locations, required preservation, proper containers, correct sample container cleaning procedures, sample holding times from collection to analysis, and sample shipping and storage conditions✓ **Attachment F, Sampling Instructions**;
- ensure that appropriate forms are legibly filled out in indelible ink or hard copies of electronic data are available. See Chapters IV, V, and VI for specific items to be included✓ **Attachment G, Sample Handling Procedures—also F includes need for water proof ink.**
- describe how samples are checked when they arrive for proper containers and temperature and how samples are checked for proper preservation (e.g., pH, chlorine residual) before analysis;
- ensure that sampling protocol is written and available to samplers. **Attachment G, Sample Handling Procedures in the section on "Sample Rejection Policy" lists improper preservations but does not say when or how this is checked.**

11.5 Laboratory sample receipt and handling procedures

- bound laboratory note books, if used, should be filled out in ink; entries dated and signed (A secure, password protected, electronic data base is acceptable**); Section III H. in the body of the document is entitled Data Management, but does not specify format of laboratory bench records (ink, entries dated and signed etc.**
- store unprocessed and processed samples at the proper temperature, isolated from laboratory contaminants, standards and highly contaminated samples and, sometimes, each other; holding times may not be exceeded; **Manual does not address sample storage in the laboratory except for microbiology (Section 6.0 Microbiology Water Sample Collection & Handling (within Attachment G)**
- maintain integrity of all samples, (e.g., by tracking samples from receipt by laboratory through analysis to disposal); **Sample log-in is described. This includes assignment of unique lab numbers (e.g., 050001 for first sample for 2005 in Attachment G, but internal/within-lab tracking is not included (nor is it required). It is suggested that the manual include security procedures to protect sample integrity.**
- require Chain-of-Custody procedures for samples likely to be the basis for an enforcement action (see Appendix A) ✓ **Attachment I Chain of Custody and includes a copy of Lab Cert. Manual procedures**;
- specify criteria for rejection of samples which do not meet shipping, holding time and/or preservation requirements and procedures for notification of sample originators. ✓**Attachment**

G, Sample Handling Procedures in the section on "Sample Rejection Policy" and it is indicated customer will be called if they provided a phone number.

11.6 Instrument calibration procedures (may reference SOP)

- specify type of calibration used for each method and frequency of use✓ **Section III C, SOPs part e p. 8 and Section III D, Instrument and Equipment Calibration** ;
- describe calibration standards' source, age, storage, labeling✓**Section III C, SOPs part d and e, p. 8 suggest more detail/specifics on labeling of calibration standard preparations**;
- perform data comparability checks; ✓ **Section III H, Data Management, p.9, lists peer and supervisor review. Also Attachment H, Chemistry Data Reporting Procedure specifies a peer review (cross-check) for any value that exceeds MCL.**
- use control charts ~~and for radiochemistry, report counting errors with their confidence levels~~. ✓ **Appendix N specifies accuracy charts and on-going records of sample duplicates.**

11. 7 Analytical procedures (may reference SOP)

- cite complete method manual **The Chemistry SOPs do cite the reference methods (e.g., APHA or EPA) and the Lab Cert Manual (5th edition) but do not site the lab's Manual for QA—need to check for microbiology.**
- describe quality control procedures required by the methods that need to be followed. ✓**Section III. C, SOPs and Attachment C SOPs Manual & Analytical Methods emphasis requirements of the mandatory method.**

11.8 Data reduction, validation, reporting and verification (may reference SOP)

- describe data reduction process: method of conversion of raw data to mg/L, picocuries/L, coliforms/100 mL, etc. ✓ **Attachment K, Data Reduction, Validation, Reporting and Storage**;
- describe data validation process✓ **Attachment K, Data Reduction, Validation, Reporting and Storage**;
- describe reporting procedures, include procedures and format✓ **Attachment K, Data Reduction, Validation, Reporting and Storage**;
- describe data verification process✓ **Attachment K, Data Reduction, Validation, Reporting and Storage**;
- ~~for radiochemistry, describe reporting of counting uncertainties and confidence levels~~;
- describe procedure for data corrections **Not Addressed.**

11.9 Type of quality control (QC) checks and the frequency of their use (see Chapters IV, V and VI).(may reference SOP) ✓

Parameters for chemistry and radiochemistry should include or reference:

- instrument performance check standards✓ **Chemistry SOPs have a "QC" section—need to check microbiology SOPs.;**
- frequency and acceptability of method detection limit (MDL) calculations **Section III, C, SOPs c, Qualification of analysts & Attachment P (definitions)—suggest that the forms used by the laboratory be described/included;**
- frequency and acceptability of demonstration of low level **Attachment N Precision &**

Accuracy Samples "Reporting Limit Verification"—each calibration, the lowest calibration standards serve to verify RL.

- calibration, ~~internal and surrogate~~ standards✓ **Section III, C, e (as listed above).**
- laboratory reagent blank, field reagent blank and trip blank✓ **Attachment N Precision & Accuracy Samples.**
- field and laboratory matrix replicates ✓ **Attachment N Precision & Accuracy Samples.**
- quality control and proficiency testing samples✓ **Attachment M Internal Quality Control Checks (Samples) and the Frequency of their use. Also, Attachment O, Proficiency Testing Procedures give more details on proficiency testing samples..**
- laboratory fortified blank and laboratory fortified sample matrix replicate✓ **Attachment N Precision & Accuracy Samples.**
- initial demonstration of method capability ✓**Section III, C, SOPs c, Qualification of analysts & Attachment P (definitions)—suggest that the forms used by the laboratory be described/included;**
- use of control charts ✓**Appendix N specifies accuracy charts and on-going records of sample duplicates.**
- ~~qualitative identification/confirmation of contaminants~~.

Parameters for microbiology should include or reference: **Though it reads that this QM covers all environmental analyses areas, a section on QC for microbiology is needed like the one provided for chemistry (Attachment N)**

- positive and negative culture controls;
- confirmation/verification of presumptive total coliform positive samples;
- sterility controls;
- proficiency testing and quality control samples.

11.10 List schedules of internal and external system and data quality audits and inter laboratory comparisons (may reference SOP) **Performance and System Audits are described in Section IV., Quality Monitoring, however schedule/frequency is not specified.**

11.11 Preventive maintenance procedures and schedules

- describe location of instrument manuals and schedules and documentation of routine equipment maintenance ✓**Attachment L, Preventive Maintenance** ;
- describe availability of instrument spare parts in the laboratory **Not addressed**;
- list any maintenance contracts in place **Not addressed**.

11.12 Corrective action contingencies

- describe response to obtaining unacceptable results from analysis of PT samples and from internal QC checks ✓**Attachment M Internal Quality Control Checks and Frequency of Their Use & Corrective Action;**
- name persons responsible for the various corrective actions ✓**Attachment M Internal Quality Control Checks and Frequency of Their Use & Corrective Action;**
- describe how corrective actions taken are documented ✓**Attachment M Internal Quality Control Checks and Frequency of Their Use & Corrective Action;**

11.13 Record keeping procedures

- describe procedures and documentation of those procedures ✓**Attachment K, Data Reduction, Validation, Reporting and Storage;**
- list length of storage, media type (electronic or hard copy) ✓**Attachment K, Data Reduction, Validation, Reporting and Storage;**
- describe security policy of electronic databases **Not addressed—contains very little on electronic data (Attachment H for Micro reporting mentions the SWEET data base for reporting);**

all electronic data should have software support so it may be regenerated **Not addressed—contains very little on electronic data(Attachment H for Micro reporting mentions the SWEET data base for reporting);;**

-

If a particular item is not relevant, the QA plan should state this and provide a brief explanation. A laboratory QA plan should be responsive to the above items while remaining brief and easy to follow. Minimizing paperwork, while improving dependability and quality of data, are the intended goals.

WEST VIRGINIA DEPARTMENT OF HEALTH
AND
HUMAN RESOURCES

Office of Laboratory Services
MANUAL
OF
QUALITY ASSURANCE
for
Environmental Chemistry Laboratory
and
Environmental Microbiology Laboratory

2006

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Director of Laboratory

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8:00 AM – 5:00 PM Monday – Friday
Closed Saturdays, Sundays & Holidays

INTRODUCTION

This manual has been assembled to describe the quality assurance system employed by the Office of Laboratory Services Environmental Sections. This quality assurance system is designed to assist all laboratory personnel in producing accurate and precise laboratory results in an efficient, economical, and professional manner. Procedures and policies outlined in this manual are superseded by any subsequent changes in policy and regulation by the Department of Health and Human Resources (DHHR), Division of Personnel, (DOP) or legislative action. Policies and regulations of the DHHR, DOP or the legislative action are maintained by the administrative offices of the main laboratory and are available for all laboratory personnel to review at any time. Other changes may be made by the Environmental Protection Agency (EPA) and should be noted as they are available.

The Environmental Chemistry Section of the Office of Laboratory Services (OLS) is located at Big Chimney, West Virginia. The Environmental Microbiology Section is located within the main laboratory in South Charleston, WV. Both sections are committed to providing quality data and services to their clients. The data produced at these facilities assist clients to meet compliance criteria for drinking water under the Safe Drinking Water Act. These data support activities of the Bureau for Public Health's Office of Environmental Health Services.

It should be recognized that this manual is not all inclusive. Omissions from the manual do not alleviate responsibility on the part of administration or employees to follow policies and procedures. Quality is the responsibility of every employee. All employees will find this manual to be a guide to continued maintenance and improvement of the quality of our laboratory services.

Approved By: _____ _____
Director Date

Revised By: _____ _____
Associate Director Date

_____ _____
Chemistry Program Manager I Microbiology Supervisor

_____ _____
Date Date

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ENVIRONMENTAL CHEMISTRY and ENVIRONMENTAL MICROBIOLOGY
QUALITY ASSURANCE MANUAL

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APPENDICES

QUALITY ASSURANCE

Quality Assurance (QA) is an integrated process for management activities involving planning, implementation, assessment, reporting and quality improvement. Quality Assurance is an integral part of the quality system. Quality Assurance is a planned and systematic approach to provide confidence that requirements for quality are met. The QA Plan is designed to ensure that environmental test results and the delivery of these services are of the highest quality. Quality is measured from the collection of specimens and samples through the reporting of results. The laboratory quality assurance plan shall be incorporated into the quality plan established by the Office of Environmental Health Services, Bureau for Public Health, which is required for the implementation of the Safe Drinking Water Act in West Virginia.

LABORATORY QUALITY ASSURANCE PLAN

I. PURPOSE AND OVERVIEW

The Office of Laboratory Services Environmental Sections will have a Quality Assurance Plan which ensures that all work is performed in accordance with EPA approved methods and procedures, monitored for control, corrected when deviations occur and properly documented.

At a minimum, the Quality Assurance Plan will consist of the following elements:

- A system to document problems that occur as a result of breakdown in communication between the laboratory and the client who orders and receives test results;
- A system to assure that complaints and/or problems are documented and investigated;
- An ongoing mechanism for monitoring and evaluating the test system;
- An ongoing mechanism to monitor corrective action taken for any unacceptable, unsatisfactory or unsuccessful proficiency testing results;
- An ongoing mechanism to evaluate the effectiveness of the laboratory's policies and procedures for ensuring employee competency;
- A mechanism for documenting and assessing problems identified during quality assurance reviews and audits.

II. AUTHORITY/RESPONSIBILITY FOR QUALITY ASSURANCE PLANS

A. *OLS Administration (Director, Associate Director, Program Manager/Supervisor,) will support quality assurance by encouraging excellence in measurement and assist in providing the physical and mental environment conducive to its achievement. To accomplish this purpose, OLS Administration shall:*

1. Evaluate the selection and use of methods/procedures to ensure that all mandates and recommendations of EPA are met.
2. Ensure that analysts receive training and are qualified for assigned work;
3. Delegate authority to implement QA plans;
4. Ensure that action is taken to implement corrective measures;
5. Communicate changes in policy and in state/federal regulations.

B. *A Quality Assurance Committee shall be established. All staff in the Environmental Chemistry and Microbiology Sections will serve on the respective Committee. The section supervisor / program manager will serve as the Quality Assurance (QA) Officer in each section. The QA Officer or designee shall be responsible for the following:*

1. Conducting periodic staff meetings to review laboratory operations and quality assurance:

2. Ensuring that each section's QA Manual is current and complete;
3. Gathering QA information and making recommendations for QA;
4. Serving as a liaison between the administration and other staff.

C. *Responsibility of Program Manager/Supervisor*

1. Coordinate section activities to ensure compliance with federal and state regulations;
2. Assist in the planning/development of QA policies and practices;
3. Monitor all phases of laboratory sample integrity, instrument calibration and maintenance, analytical procedures, controls and corrective action, documentation, analyses of reports performed in the laboratory for compliance with technical procedures and QA plans;
4. Serve as the section representative, or designate an individual, to serve on the OLS Laboratory Management Team at the main laboratory in South Charleston, WV. Other staff may be assigned QA duties and serve at the discretion of the program manager/supervisor;
5. Revise and update technical and other section procedures when changes are necessary and review periodically;
6. Perform operations in accordance with applicable procedures;
7. Keep administration advised of problems, questionable results, unusual aspects of laboratory samples, safety issues and laboratory accidents.

D. *Responsibility of all other staff*

1. Perform operations in accordance with applicable procedures;
2. Keep program manager/supervisor advised of problems, questionable results, and unusual aspects of laboratory samples, safety issues and laboratory accidents;
3. Make recommendations and suggestions for improvements to section program manager/supervisor;
4. Perform all work in a careful, responsible and safe manner.

III. COMPONENTS OF QA PLAN

The Manual of Quality Assurance will include the elements to monitor and evaluate pre-analytical, analytical and post-analytical activities. Each laboratory section will incorporate these elements and others that are critical to the functions of the section and describe how they will be done.

A. *Personnel Qualifications and Training*

Personnel shall be qualified by education, training and/or experience for a particular task. Personnel qualifications will be documented and maintained by the Director of the Office of Laboratory Services. Procedures for evaluation will be adopted and in keeping with state and federal labor practices.

B. *Safety Procedures*

These procedures should ensure compliance with OSHA and other state and federal guidelines where applicable. The Safety Manual prepared by the main Office of Laboratory Services in South Charleston will be adopted. A member of the Environmental Chemistry Section will serve on the OLS Safety Committee and act as liaison to the OLS Safety Officer. A Safety Focus Group will be established at the Environmental Chemistry Laboratory. The Safety Focus Group will address safety issues specific to Environmental Chemistry and report to the OLS Safety Committee.
Procedures will include guidelines for:

- Employee safety orientation and training
- Protective clothing and equipment
- Housekeeping

C. *Standard Operating Procedures Manual (SOP)*
The SOP Manual is a document that states which and how tests are performed and references the EPA approved method. Procedure manuals are essential to each operating section and serve purposes which include:

- Training of new employees
- Assurance that procedures are performed consistently by all employees
- Troubleshooting unexpected results
- Keeping employees aware of new and revised procedures

1. Elements of the Standard Operating Procedure (SOP)
The standard operating procedures testing manual of environmental samples should contain the following elements:
   a. Requirements* for sample collection and processing criteria for sample rejection.
   *Criteria for unacceptable samples: quantity not sufficient, improper preservation, etc.
   SPECIFY:
      - Type sample
      - Point of Collection
      - Sample Volume
      - Holding time
   b. Test procedure
   SPECIFY:
      - Test Method Number (EPA Standard Methods)
      - Step-by-step instructions
      - Directions for performing test calculations
      - How to interpret and read test results
   c. Qualification of Analysts
   DESCRIBE:
      - Initial Demonstration of Capability (IDC)
      - IDC for precision and accuracy

- IDL / MDL studies
- Passing an unknown

d. Preparation of spikes, standards, QC samples, reagents, and other materials used in the test (or source for ordering).
LIST:
- All reagents, controls, etc., required for testing and indicate location
- Reagent storage instructions
- Step-by-step instructions for reagent preparation, include any safety precautions and expiration date.

e. Calibration and calibration verification procedures
LIST:
- Step-by-step instructions for instrument calibration
- Include the identity, concentration, number of standards, and calibration frequency

f. Calibration range of test results and minimum reporting limit
- Use calibration data as verification of this range

g. Quality Control procedures
- State identity, level and frequency of control (QC standards, spikes, etc.)
- Explain preparation of controls and handling
- Give testing control step-by-step instructions
- State control limits
- Describe how quality control results are recorded.

h. Remedial action to be taken when calibration and control results deviate from expected values or patterns
- State corrective action such as recalibration, trouble-shooting, etc.
- Documentation of corrective actions

i. Limitations in the test methodology
- List interfering substances or conditions
- Specify other common sources of error that could cause erroneous test results

j. References
- Pertinent literature method references
- Include manufacturer's product literature, textbooks, journals, etc.
- State alternate procedure to use during technician or instrument downtime

D. *Instrument and Equipment Calibrations*

1. Detailed, stepwise calibration procedures will be documented for all equipment and instrumentation requiring calibration. Each procedure will include a description of the equipment/instrument, reference standards used, the calibration technique, acceptable performance tolerances and frequency of calibration.

2. Documentation will be maintained to record the dates, calibration, and values in order to assure the consistent practice of periodic calibrations.

E. *Maintenance Procedures*

1. Routine preventive maintenance (in-house or contracted) procedures and frequencies shall be established for all equipment and records will be maintained.
2. Unscheduled maintenance (downtime) will be documented to record problem (s) and corrective actions(s) taken to restore equipment to full service.

F. *Standards, Reagents, Glassware and Special Supplies*

1. Glassware cleaning, preparation, storage and shelf life of standards and quality grade of reagents, media and supplies shall be determined for the technical procedure in which they are used.
2. Reagents, standards, stock solutions and special supplies will be properly labeled and will not be used after the expiration date.
3. If purchasing regulations require the change of brands of any reagent, standards and special supplies, the OLS Fiscal Section will notify the technical section immediately for verification of the product quality.

G. *Technical Procedures*

1. All routine technical procedures will be current, approved and performed exactly as written in the SOP Manual and the referenced method.
2. Procedures used to determine the limits of reliable measurement (detection limits, quantitation limits, etc.) will be clearly written, explained and referenced.
3. In-house technical procedures will have validation documentation if appropriate. The official or validated references will also be cited. Validation data, such as precision, bias, specificity, method sensitivity, etc. will be established by recognized, referenced techniques.
4. If a technical procedure produces a hazardous waste, the procedure will identify the hazardous waste and the method of disposal. All hazardous materials will be handled and disposed according to laboratory safety policy.
5. Method manuals will be available in the laboratory work area.

H. *Data Management*

Where applicable, documented protocols will be used to ensure that raw data are calculated correctly, converted to appropriate units, transcribed correctly, reported to clients and stored properly. All systems should be backed up and verified to avoid loss or modification of data. Adequate

measures should be taken to avoid tampering with stored data. Procedures for archival storage and disposal of data records will be documented. All data will be subject to review by administration, supervisors and/or peers.

I. *Internal Quality Control (QC Sample)*

All internal QC will be documented and available. Documentation should be done in such a manner that it can be easily reviewed by staff, administration, or certification officers. Documentation of quality should be available on a daily basis. This documentation shall include the action taken to correct out-of-control situations.

J. *External Quality Control – PT Studies*

1. All Performance Evaluation Study data (proficiency testing, performance evaluation studies, collaborative studies, audits, etc.) will be documented and available. Master records will be maintained by the Program Manager/Supervisor's Office. Each worker will be responsible for keeping copies within the section and keeping the master file up-to-date.
2. The QA Manual will have a section describing the proficiency testing performed by each section.
3. Each section will identify and document the action to be taken when proficiency testing results are unacceptable. This documentation will, in part, be done by filing a plan of correction with the Laboratory Program Manager/ Supervisor and the Laboratory Director. Copies of the of correction will be filed with unacceptable external quality control report and with the section records. The plan of correction may also be requested by EPA.

K. Precision and Bias

1. All procedures used to determine precision (repeatability, reproducibility) and bias (data accuracy, systematic error) shall be clearly written and explained.
2. Precision and bias data will be included on reports of analysis when appropriate or requested.

L. Corrective Action Contingencies

Procedures shall be established to initiate corrective action for unacceptable analytical results. All actions shall be documented.

M. Waste Disposal

1. All laboratory waste will be handled appropriately as to classification whether hazardous or non-hazardous.
2. Hazardous waste (biological, chemical and physical) will be handled, transported, stored, treated and/or disposed by documented procedures.

IV. QUALITY ASSURANCE MONITORING

A. Performance and Systems Audits

With guidance of the Quality Assurance Committee, systems for performance and compliance monitoring will be instituted. A QA Audit Team or designee will be identified to conduct on-site audits of performance and systems operations. Appropriate administrative leadership will be responsible for developing specific audit procedures.

- This performance audit is an independent check by a supervisor, a team or other person designated by the laboratory director or associate director or the QA committee to evaluate the data produced by a section's analytical system, or to evaluate a specific service provided by a non-technical area (efficiency of sample reporting, purchasing, etc.)
- The systems audit is an on-site inspection or assessment of a section's quality system. These checks may be made by the supervisor, a team, or other person designated by the director or the QA committee.

B. Procedure for Systems Audit

1. Preparation
   - An Audit Team or person will be selected and the team will agree on the emphasis for the on-site survey.
   - The section to be audited should be notified verbally and in writing two weeks (minimum) prior to the audit. However, prior notification to the section can be waived at the discretion of the Director or Associate Director.
   - A preliminary review of the section's technical procedures, proficiency testing or performance review results, qualifications, training and duties of personnel should be made prior to an on-site review of the area.
   - A checklist will be developed to state the purpose of the audit and to cover the relevant elements. These items will be reviewed to determine their levels of implementation, adequacy, and improvement within the QA Program. This checklist should provide a means of structure for the audit; the checklist is not all inclusive.
2. Performance of Audit

   The on-site review should include, but is not restricted to:
   - Interviewing personnel
   - Observation of the section's operation for conformance to QA Plans and Procedures
   - Evaluation of QC data
   - Verification of calculations
   - Verification of calibrations
   - Review of worksheets
   - Tracking of lab samples

- Verification of storage conditions
- Verification that sample analyses are performed within the required time frames
- Verification that expiration dates are not being exceeded for samples, standards, reagents, media, QC check samples, etc.

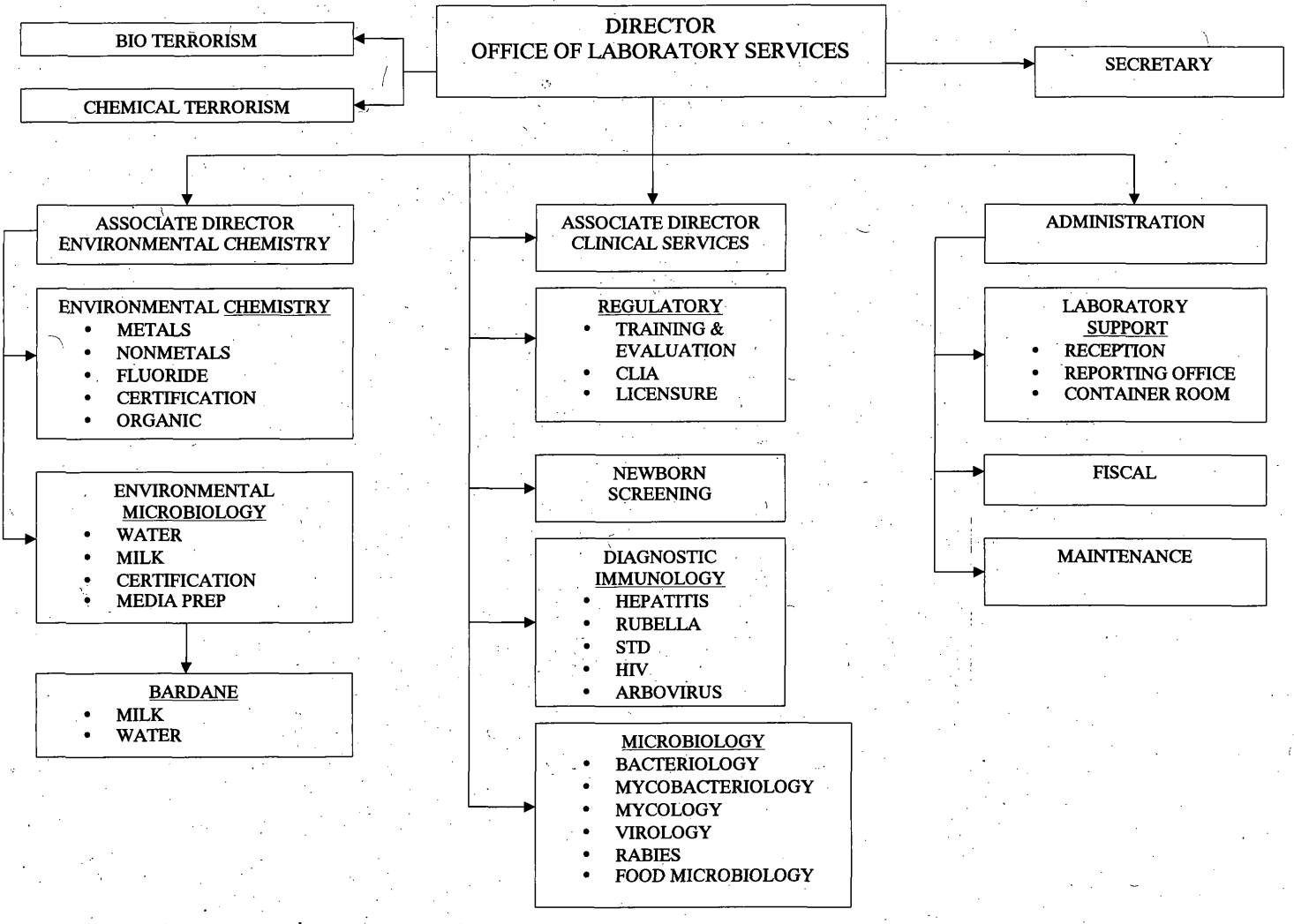
3. Audit Closure
   At the conclusion of the audit, a preliminary close-out meeting should be held with the section to discuss the audit.
4. Audit Report
   The Audit Team should prepare a written report within 45 days of the audit. The report should be brief, concise and understandable to those involved. The findings should include improvements or outstanding performance as well as deviations. The purpose of the audit is to improve performance, provide education, and verify that the laboratory section is maintaining the required standard of quality.
   The initial report should be presented to the section supervisor for discussion and agreement of findings between the supervisor and the persons performing the audit. A final, dated, written report should be presented to the director and associate director and to the QA Committee.
   The QA audit report will request a written plan of correction for any noted deficiencies. The plan-of-correction report will outline the steps taken to correct the deficiency.
5. A corrective action report prepared by the section supervisor or designee will be forwarded to the Audit Team leader and director within the time frames specified by the Audit Team.
   Staff will be notified if the QA audit cites problems that may require assessment of previously reported data or significant problems that may affect clients.

APPENDIX A

LABORATORY ORGANIZATION

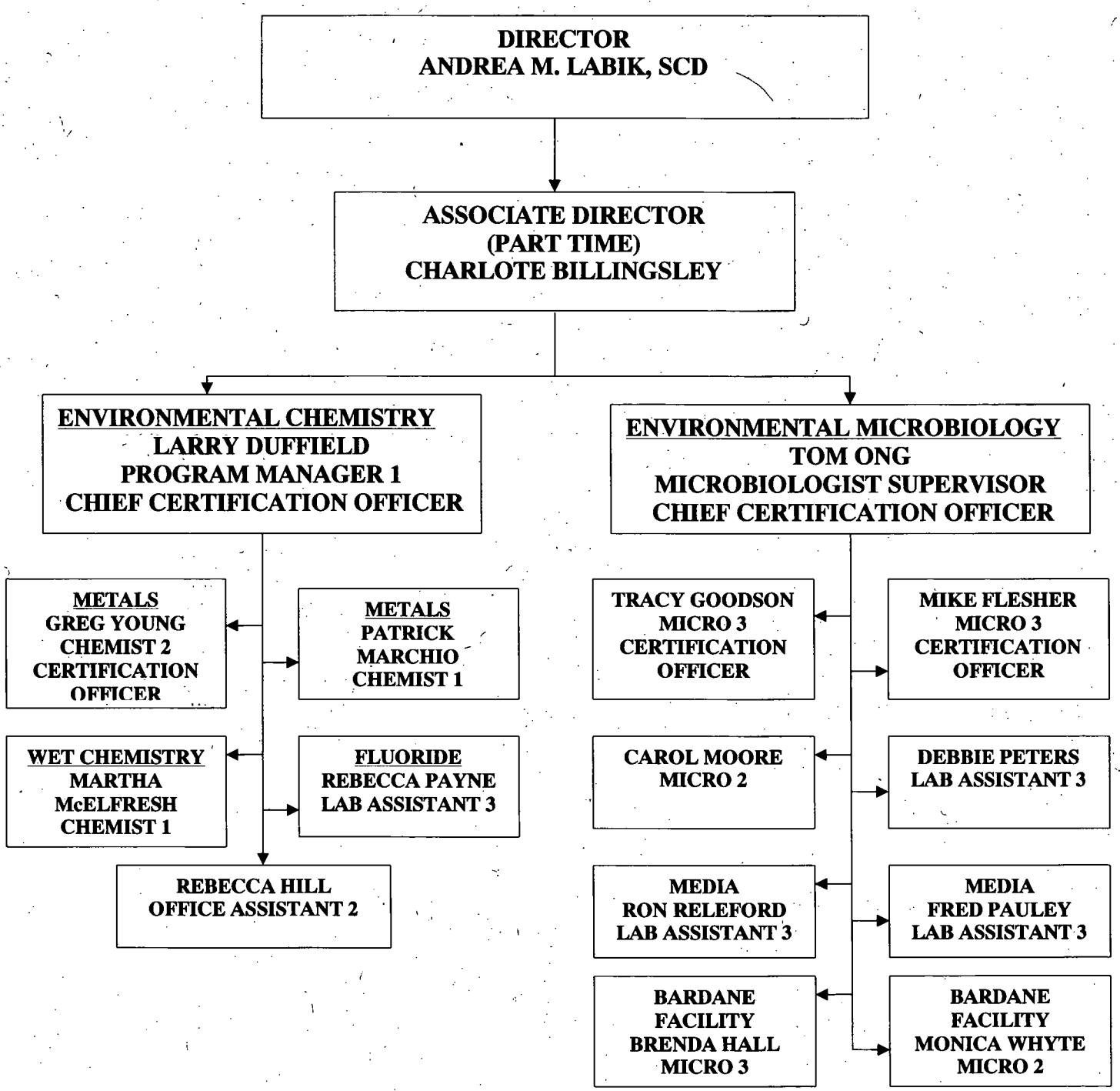
AND

RESPONSIBILITY



WEST VIRGINIA BUREAU FOR PUBLIC HEALTH
OFFICE OF LABORATORY SERVICES

ENVIRONMENTAL LABORATORIES



APPENDIX B

ENVIRONMENTAL CHEMISTRY and ENVIRONMENTAL MICROBIOLOGY LABORATORIES

PERSONNEL JOB DESCRIPTIONS

Office Director 3 provide overall direction and supervision to the health laboratory of the State of West Virginia which includes clinical diagnostic work and Environmental Laboratory activities. Reports directly to the Commissioner for Public Health.

Part time Associate Director for Environmental Laboratory including chemistry and microbiology, milk testing. Reports to the Laboratory Director.

Program Manager 1 with responsibility for Environmental Chemistry Section and serves as the Chief EPA Certification Officer with responsibility for oversight of the Chemistry Program for West Virginia's Safe Drinking Water Program (SDWA). Reports to the Associate Director for Office of Laboratory Services (OLS) and the OLS Director. Certified for Organics and Inorganic Analytes.

Chemist 2 works in the Metals and Wet Chemistry Sections, providing technical and analytical support to two Chemists I and a Laboratory Assistant III. Serves as liaison with the Chemical Terrorism Laboratory, developing new methods. Certified by EPA for Inorganic analytes and assists the Program Manager with on-site surveys and record keeping. Reports to Program Manager.

Chemist 1 works in the Metals Section. Reports to the Program Manager.

Chemist 1 works in the Wet Chemistry Section. Reports to the Program Manager.

Laboratory Assistant 3 performs Fluoride Tests for the Bureau of Public Health's Pediatric Fluoride Program and for the Public Water Systems. Assists with Wet Chemistry titrations. Reports to the Program Manager.

Office Assistant 2 performs general office tasks, maintains Certification Program records, sample records, reports test results; and serves as sample custodian. Reports to Program Manager.

Part time Chemistry Specialist Consultant (not EPA certified for SDWA) may assist with on-site SDWA surveys when additional expertise is needed.

Microbiologist Supervisor (Laboratory Certification Officer) provides overall direction and supervision in planning, directing, and coordinating the microbiology laboratory; provides consultative and training services. Serves as the Quality Assurance Officer and Certification Officer for Microbiology. Reports to the Associate Director.

Microbiologist 3 (Laboratory Certification Officer)
Under limited supervision perform work at an advanced level by providing technical assistance and consultation to other microbiological personnel. Meet the standards of the Safe Drinking Water Act and the requirements of the Inter/Intra-State Milk shippers. Conduct complex and advanced microbiological examinations. Maintain required State and Federal documentation. Responsible for Quality Assurance, Safety and preventative maintenance for the Environmental Microbiology Section. Conduct on-site surveys of drinking water laboratories, prepare final reports and determinations of laboratories certification status. Monitor corrective actions to deviations found during surveys. Plan, prepare and distribute Proficiency Test Samples to other analysts throughout the state and interpret the results. Trains and supervises subordinate microbiological laboratory personnel.

Microbiologist 3 (Laboratory Certification Officer) provides laboratory specimen testing and allied services that are consistent with the federal/state program requirements to ensure the sanitary quality of milk and water for intra/interstate consumers/users. Examine samples as described in *Standard Methods for the Examination of Dairy Products*, Standard Methods for the *Examination of Water and Waste Water*, memoranda or guidelines from the Food and Drug Administration (FDA), U.S. Environmental Protection Agency (USEPA) and related agencies and Federal Registers. Provides oversight to the technical aspects of the Media and Glassware Preparation Unit.

Microbiologist 3 same as the above description, but does not serve as a certification officer. Oversees and directs out posted laboratory.

Microbiologist 2 performs full performance professional microbiological examinations of drinking water. Works under the general supervision of a higher level microbiologist. Makes qualitative and quantitative bacteriological analyses of drinking water. Uses computer for entry of lab results and quality control.

Laboratory Assistant 3 performs under general supervision, works at the advanced level by conducting varied technical laboratory tests, analyses, complex and difficult laboratory tasks and examinations. Provides comprehensive assistance to technical or professional personnel. May have lead worker responsibility. Performs related work as required.

WEST VIRGINIA LABORATORY
CERTIFICATION PROGRAM FOR SDWA

(Certification Officers work under the direction of the Laboratory Director and the Associate Director The Laboratory Director has direct access to the Commissioner of the Bureau for Public Health)

All Personnel are classified and qualified for their job title by the West Virginia Department of Personnel. All persons must possess acceptable knowledge through education, training and/or experience. Persons qualifying as Certification Officers must have successfully completed the training courses offered by EPA in their specific disciplines(s). All persons performing analytical testing must demonstrate competency for the tests they perform and have knowledge of quality control and quality assurance.

Management Staff

Laboratory Director – Andrea Labik, Sc.D.
Associate Director (Part Time) – Charlotte Billingsley, M.S.
Environmental Chemistry Program Manager – Larry Duffield, B.S.
Microbiology Supervisor – Thomas Ong, B.S.

Certification Staff – Chemistry

Larry Duffield – Chief Certification Officer for Inorganic and Organic Tests
Gregory Young – Certification Officer for Inorganic and Organics Tests
Patrick Marchio – Certification Officer for Inorganic Tests

Certification Staff – Microbiology

Thomas Ong – Chief Certification Officer
Tracy Goodson – Certification Officer
Mike Flesher – Certification Officer

The supervisor will maintain employee job descriptions and make them available to anyone needing that information. The individual employee will also maintain a copy of the job description. Both the supervisor and the employee should periodically review the job description.

APPENDIX C

STANDARD OPERATING PROCEDURES MANUAL
And
ANALYTICAL METHODS

Each employee will be responsible for the Standard Operating Procedures (SOP)'s) required for their test(s). The supervisor and employee will periodically review the procedures to make certain they are current and up-to-date. The director, supervisor and employee will sign-off on the SOPs following review. All test methods referenced must be approved by EPA and SOPs must meet the criteria and standard outline in Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-R-05-004, January 2005.

All SOPs used in the laboratory for regulatory analyses shall be based upon and referenced to either "Standard Methods for the Examination of Water and Wastewater," 18th Edition or currently approved EPA methodologies. Copies of the SOPs are maintained by the analyst in each section and are reviewed and approved by the Program Manager/Supervisor.

The following page lists the Standard Operating Procedures used by The Office of Laboratory Services.

INORGANIC STANDARD OPERATING PROCEDURES

Parameter	Method Number	Methodology	Project # Name	Location
Aluminum	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Antimony	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Arsenic	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Barium	EPA 200.7 R4.4	INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION	SOPMET00300	METALS LAB
Beryllium	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Cadmium	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Chromium	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Copper	SM 18th ED 3111B	Air – Acetylene Flame Atomic Absorption	SOPCuFLAME	METALS LAB
Copper	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Iron	SM 18TH ED 3111B	AIR-ACETYLENE FLAME ATOMIC ABSORPTION	SOPMET00500	METALS LAB
Lead	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Manganese	SM 18TH ED 3111B	AIR-ACETYLENE FLAME ATOMIC ABSORPTION	SOPMET00500	METALS LAB
Mercury	EPA 245.1 R3.0	COLD VAPOR ATOMIC ABSORPTION	SOPMET00100	METALS LAB
Nickel	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Selenium	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Silver	SM 18TH ED 3113B	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00200	METALS LAB
Sodium	SM 18TH ED 3111B	AIR-ACETYLENE FLAME ATOMIC ABSORPTION	SOPMET00500	METALS LAB
Thallium	EPA 200.9 R2.2	ELECTROTHERMAL ATOMIC ABSORPTION	SOPMET00400	METALS LAB
Zinc	SM 18TH ED 3111B	AIR-ACETYLENE FLAME ATOMIC ABSORPTION	SOPMET00500	METALS LAB
Alkalinity, Total	SM 18TH ED 2320B	TITRATION	SOPWET00400	WET LAB
Calcium	SM 18TH ED 3500CaD	EDTA TITRIMETRIC	SOPWET00500	WET LAB
Calcium Hardness	SM 18TH ED 3500CaD	EDTA TITRIMETRIC	SOPWET00500	WET LAB
Chloride	EPA 300.0 R2.1	ION CHROMATOGRAPHY	SOPWET00200	WET LAB
Conductivity (µmhos/cm)	SM 18TH ED 2510B	ELECTRODE	SOPWET00100	WET LAB
Cyanide, Free	SM 18TH ED 4500CN F	ION SELECTIVE ELECTRODE	SOPWET00600	WET LAB
Fluoride	EPA 300.0 R2.1	ION CHROMATOGRAPHY	SOPWET00200	WET LAB
Fluoride	SM 18TH ED 4500F C	ION SELECTIVE ELECTRODE	SOPWET01200	WET LAB
Hydrogen Sulfide	EPA 376.2 R	METHYLENE BLUE, COLORIMETRIC	SOPWET01100	WET LAB
Nitrate – N	EPA 353.2 R2.0	CADMIUM REDUCTION	SOPWET00300	WET LAB
Nitrate – N	EPA 300.0 R2.1	ION CHROMATOGRAPHY	SOPWET01300	WET LAB
Nitrate/Nitrite – N	EPA 353.2 R2.0	CADMIUM REDUCTION	SOPWET00300	WET LAB
Nitrite - N	EPA 300.0 R2.1	ION CHROMATOGRAPHY	SOPWET01300	WET LAB
Nitrite – N	EPA 353.2 R2.0	CADMIUM REDUCTION	SOPWET00300	WET LAB
pH (pH Units)	EPA 150.1	ELECTROMETRIC	SOPWET00700	WET LAB
Sulfate	EPA 300.0 R2.1	ION CHROMATOGRAPHY	SOPWET00200	WET LAB
Total Hardness	SM 18TH ED 2340C	EDTA TITRIMETRIC	SOPWET00900	WET LAB
Total Dissolved Solids	SM 18TH ED 2540C	GRAVIMETRIC	SOPWET00800	WET LAB
Turbidity (NTU)	EPA 180.1 R2.0	NEPHELOMETRY	SOPWET01000	WET LAB

WATER MICROBIOLOGY OPERATING PROCEDURES

Parameter	Method	Description	Location
Total Coliforms	SM 9221 B SM 9222 B SM 9223 B	Multi Tube Fermentation Membrane Filtration Colilert/Colilert-18/Quanti Tray	Water Lab
Fecal Coliforms	SM 9221 E	EC Medium	Water Lab
E. coli	SM 9223 B	Colilert/Colilert-18/Quanti Tray	Water Lab
Heterotrophic Bacteria	SM 9215 B	Pour Plate Method	Milk Lab

APPENDIX D
WEST VIRGINIA CERTIFIED ANALYTES FOR DRINKING WATER

FOR A LIST OF APPROVED DRINKING WATER METHODS GO TO THE EPA WEBSITE

MICROBIOLOGY

Total Coliforms
Fecal Coliforms/E.Coli
Heterotrophic Bacteria

INORGANIC - TRACE METALS

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Copper
Lead
Mercury
Selenium
Thallium

INORGANIC – NON-METALS

Bromate
Chlorite
Cyanide
Fluoride
Nitrate-N
Nitrite-N

ORGANIC PESTICIDES

Alachlor
Aldicarb
Aldicarb Sulfone
Aldicarb Sulfoxide
Atrazine
Carbofuran
Chlordane
Endrin
Heptachlor
Heptachlor Epoxide
Hexachlorobenzene
Hexachlorocyclopentadiene
Lindane
Methoxychlor
Oxamyl (Vydate)
Simazine
Toxaphene

ORGANIC HERBICIDES

2,4-D
Dalapon
Dinoseb
Diquat
Endothall
Glyphosate
Pentachlorophenol
Picloram
2,4,5-TP (Silvex)

ORGANICS, TRIHALOMETHANES

Bromodichloromethane
Bromoform
Chlorodibromomethane
Chloroform

ORGANICS, VOLATILE ORGANIC COMPOUNDS

Benzene
Carbon tetrachloride
Chlorobenzene
1,2-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichloroethane
1,1-Dichloroethylene
cis-1,2 Dichloroethylene
trans-1,2 Dichloroethylene
Dichloromethane
1,2-Dichloropane
Ethylbenzene
Styrene
Tetrachloroethylene
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2- Trichloroethane
Trichloroethylene
Vinyl chloride
Xylenes (Total)

HALOACETIC ACIDS

Bromoacetic Acid
Chloroacetic Acid
Dibromoacetic Acid
Dichloroacetic Acid
Trichloroacetic Acid

SYNTHETIC ORGANIC COMPOUNDS

Benzo(a)pyrene
Dibromochloropropane (DBCP)
Di(2-ethylhexyl)adipate
Di(2-ethylhexyl)phthalate
Ethylene dibromide (EDB)
PCB's as Aroclors
PCB's as decachlorobiphenyl
2,3,7,8-TCDD (Dioxin)

APPENDIX E

ORDER FORM

FOR

SAMPLE BOTTLES

West Virginia Department of Health and Human Resources
Environmental Chemistry Laboratory
4710 Chimney Drive, Suite G, Charleston, WV 25302
BOTTLE REQUEST FORM

Telephone: 1-304-965-2694 Ext. 0 Fax: 1-304-965-2696

To request a test please complete the form below and return it to the laboratory either by telephone, FAX or mail.

COLLECTION SOURCE: (CHECK ONE) PRIVATE HOUSEHOLD:_____
WATER SYSTEM:_____ OTHER:_____

Public Water Supply Identification Number (PWS ID APPLIES):_____

NAME:_____

CONTACT PERSON:_____

MAILING ADDRESS:_____

CITY, STATE:_____ ZIP CODE:_____

PHONE NUMBER:_____

Parameter to be Analyzed	Number of bottles	Parameter to be Analyzed	Number of Bottles	Parameter to be Analyzed	Number of Bottles
Aluminum		Potassium		** Cyanide	
Antimony		Selenium		Fluoride	
Arsenic		Silver		** Hydrogen Sulfide	
Barium		Sodium		Magnesium	
Beryllium		Thallium		** Nitrate + Nitrite	
Cadmium		Zinc		** Nitrate	
Chromium		** Alkalinity		** Nitrite	
Copper		Calcium		** Ortho-Phosphate	
Iron		Calcium Hardness		** pH	
Lead		Chloride		** Sulfate	
Manganese		Chlorine, Free		** Total Dissolved Solids	
Mercury		Chlorine, Total		Total Hardness	
Nickel		** Conductivity		** Turbidity	

** For Regulatory Compliance these analytes require special sample bottles and preservatives.

If the water system has been notified for compliance purposes the continuous monitoring for contaminants in the water supply is needed, the laboratory can add the water system to our automatic bottle shipment schedule.

Do you wish to be added to the automatic bottle shipment list? If so, circle month for mailing.
January February March April May June July August September October November December

West Virginia Department of Health and Human Resources
Environmental Chemistry Laboratory
4710 Chimney Drive, Suite G, Charleston, WV 25302

Telephone: 1-304-965-2694 Ext. 0 NOTICE Fax:1-304-965-2696

Enclosed you will find sample collection and shipping supplies for the Environmental Chemistry Laboratory. When supplies become limited, complete the form below and return it with the sample or notify the laboratory either by telephone, FAX or mail. If you find that you need only specific or additional items, please specify in the space provided. Supplies should be requested before they run out and allowing 1-2 weeks for delivery.

Health Department:_____
Address:_____
City/State:_____ Zip Code _____
Contact Person:_____
Phone Number:_____

Supplies requested:

- ☐ Kits for 5 sampling locations.
- ☐ Kits for 10 sampling locations.
- ☐ Kits for 15 sampling locations.
- ☐ Other _____

- ☐ Cyanide sample kit.
- ☐ Combined Nitrate/Nitrite sample kit.
- ☐ Nitrite sample kit.
- ☐ Hydrogen Sulfide sample kit.

Brochures requested: Quantity Requested

- ☐ Drinking Water from Household Wells _____
- ☐ Environmental Public Health Laboratory _____
- ☐ Services for Community/Public Water Supplies _____

FLUORIDE BOTTLE REQUEST FORM

Please Allow 1-2 Weeks for Sample Bottle Delivery

Mail or fax:

West Virginia Department of Health and Human Resources
Office of Laboratory Services
Water Fluoridation Section
4710 Chimney Drive, Suite G
Charleston, West Virginia 25302
Phone: (304) 965-2694 EXT. 2231
Fax: (304) 965-2696

Request for Fluoride Bottles

Water Plant: _____

P.W.S. Number: _____

Address: _____

Phone: _____

Ordered by: _____

Date: _____

Comments _____

West Virginia Department of Health & Human Resources
Bureau For Public Health
OFFICE OF LABORATORY SERVICES
167 – 11th Avenue
South Charleston, WV 25303
Sample Container Department (Patsy Maynard): (304) 558-3530, Ext. 2204
Environmental Microbiology (Tom Ong): (304) 558-3530, Ext. 2710
Fax: (304) 558-2006

BOTTLE REQUESITION FORM FOR DRINKING WATER MICROBIOLOGICAL ANALYSIS

P.W.S. I.D. #: _____ (Required for All Public Water Systems)
Name: _____
Shipping Address *(Please provide a United Parcel Service Delivery Address, No P.O. Boxes, when requesting 3 or more Bottles):*
Street Address: _____
City: _____ State: _____ Zip: _____
Mailing Address *(Please provide a mailing address for the U.S. Postal Service when requesting only 1 or 2 Bottles):*
Mailing Address: _____
City: _____ State: _____ Zip: _____
Requested By: _____ Phone: _____
Date of Request: _____

Number of Bottles Requested	Number Currently On-Hand	Number Used per Month/Quarter
		□ per Month □ per Quarter

Comments
□ **Bottles Needed for Compliance (SDWA) Samples** □ **Bottles needed for GWUDI Study** □ **Bottles Needed for Repeat Samples** □ **Bottles Needed for Special Purpose Samples** □ **Address Change**

INSTRUCTIONS

1.Completely fill out the information requested above. The address is where the bottles are to be delivered.
2.If collecting for more than one Public Water System, Please list all P.W.S. I.D. Numbers.
3.Please indicate the Number of Bottles Requested along with the number Currently On-Hand (so that the bottle usage may be accurately tracked) and the Number of Samples Taken per Month/Quarter to meet SDWA Compliance. Sample bottles have a six month shelf life; therefore, the Office of Laboratory Services (O.L.S.) will provide up to a six month supply of bottles.
4.This form may be submitted to the O.L.S. by FAX, by Mail or may be included along with Monthly/Quarterly Samples.
5.The Water Bacteriological Sample Bottles are the property of the O.L.S. and must be returned to the O.L.S. for analysis. **THEY MAY NOT BE SENT TO ANY OTHER COMMERCIAL OR PRIVATE LABORATORY.**

DO NOT WRITE BELOW THIS LINE - FOR OFFICE OF LABORATORY SERVICES' USE ONLY					
Last Update	**Number Sent**	**Number Received**	**Number Outstanding**	**Number To Send**	**Date Entered**
Comments:					

BRF Rev. 12-02

APPENDIX F

SAMPLING

INSTRUCTIONS

ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

West Virginia Department of Health and Human Resources
Office of Laboratory Services
4710 Chimney Drive, Suite G
Charleston, WV 25302
Phone: 1(304)965-2694 Fax: 1(304)965-2696

INSTRUCTIONS FOR SAMPLING OF INORGANIC CONTAMINANTS TO MEET EPA COMPLIANCE MONITORING (SDWA)

LEAD and/or COPPER
First Draw

1. The lead and/or copper kit consist of a quart sample bottle, these instructions, plastic bags, sample identification tags and a return address label.

2. Use the cold water kitchen tap or bathroom tap for obtaining your sample. The sample should be taken after the water has stood motionless in the plumbing system for at least six hours.

3. **Do not rinse the bottle prior to sampling.** Fill the quart sample bottle with the water to be analyzed to within ½ inch of the top. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.

4. Fill out a sample identification tag for each system. **Include the system identification number if sampling from a public water system, date and time of sampling, point of collection (kitchen sink, ect.), source and your name as the sample collector.** This information is mandatory. If more than one sample is being mailed to the laboratory, please identify all samples and their tags in such a manner that all samples may be correctly identified prior to analysis. Place the sample tags in the zip-loc plastic bag and seal well. Use waterproof ink; non-waterproof ink will bleed if the tags become wet.

5. **Place the filled sample bottles in the large plastic zip-loc bags and seal before placing them in your shipping cartons.** This is to prevent any leakage that may occur during shipment from soaking through the outer container and damage other mail items.

For compliance monitoring *the samples must be taken from the distribution system: from a customer's faucet. Refer to your district engineer for further sampling instructions.*

For private well owners: *Sample should be taken from the tap most frequently used to obtain water for drinking.*

ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

West Virginia Department of Health and Human Resources
Office of Laboratory Services
4710 Chimney Drive, Suite G
Charleston, WV 25302
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INSTRUCTIONS FOR SAMPLING OF INORGANIC CONTAMINANTS TO MEET EPA COMPLIANCE MONITORING (SDWA)

COMBINED NITRATE + NITRITE

Maximum holding time 28 Days

1. The kit consists of a small plastic sample bottle, these instructions, plastic bags, sample identification tags and a return address label.

2. Use the cold water kitchen tap or bathroom tap for obtaining your sample. **Allow the water to run for 3 to 5 minutes prior to taking the sample.**

3. **Do not rinse the bottle prior to sampling** because it contains a small quantity of acid that acts as a sample preservative (required by EPA). Fill the sample bottle with the water to be analyzed to within ½ inch of the top. Be sure the cap is tightened to prevent leakage during shipment to the laboratory. **Invert the bottle several times to mix the sample thoroughly with the preservative.**

4. Fill out a sample identification tag for each system. **Include the system identification number if sampling from a public water system, date and time of sampling, point of collection (kitchen sink, etc.), source and your name as the sample collector.** This information is mandatory. If more than one sample is being mailed to the laboratory, please identify all samples and their tags in such a manner that all samples may be correctly identified prior to analysis. Place the sample tags in the zip-loc plastic bag and seal well. Use waterproof ink; non-waterproof ink will bleed if the tags become wet.

5. **Place the filled sample bottles in the zip-loc bags and seal before placing them in your shipping cartons.** This is to prevent any leakage that may occur during shipment from soaking through the outer container and damage other mail items.

For compliance monitoring *the samples must be taken from the distribution system: from a customer's faucet. Refer to your district engineer for further sampling instructions.*

For private well owners *or general public customers: samples should be taken from the tap most frequently used to obtain water for drinking.*

ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

West Virginia Department of Health and Human Resources
Office of Laboratory Services
4710 Chimney Drive, Suite G
Charleston, WV 25302
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INSTRUCTIONS FOR SAMPLING OF INORGANIC CONTAMINANTS TO MEET EPA COMPLIANCE MONITORING (SDWA)

NITRATE and/or NITRITE

Maximum holding time 48 Hours
Kits must be shipped "overnight" so that we receive them on Tuesday, Wednesday, or Thursday
State holidays must be taken into account

1. The kit consists of a small plastic sample bottle, foam cooler, these instructions, plastic bags, sample identification tags and a return address label.

2. Use the cold water kitchen tap or bathroom tap for obtaining your sample. **Allow the water to run for 3 to 5 minutes prior to taking the sample.**

3. **Do not rinse the bottle prior to sampling.** Fill the sample bottle with the water to be analyzed to within ½ inch of the top. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.

4. Fill out a sample identification tag for each system. **Include the system identification number if sampling from a public water system, date and time of sampling, point of collection (kitchen sink, etc.), source and your name as the sample collector.** This information is mandatory. If more than one sample is being mailed to the laboratory, please identify all samples and their tags in such a manner that all samples may be correctly identified prior to analysis. Place the sample tags in the zip-loc plastic bag and seal well. Use waterproof ink; non-waterproof ink will bleed if the tags become wet.

5. **Place the filled sample bottles in the zip-loc bags and seal before placing them in your shipping cartons. Add ice cubes to the remaining two zip-loc bags to maintain the sample temperature at 4°C and seal.** This is to prevent any leakage that may occur during shipment from soaking through the outer container and damage other mail items.

For compliance monitoring *the samples must be taken from the distribution system: from a customer's faucet. Refer to your district engineer for further sampling instructions.*

For private well owners *or general public customers: samples should be taken from the tap most frequently used to obtain water for drinking.*

ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

West Virginia Department of Health and Human Resources
Office of Laboratory Services
4710 Chimney Drive, Suite G, Charleston, WV 25302
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INSTRUCTIONS FOR SAMPLING OF INORGANIC CONTAMINANTS TO MEET EPA COMPLIANCE MONITORING (SDWA)

Inorganic metals / non-metals

Sample holding times vary; please mail as soon as possible

1. The kit consists of a quart sample bottle, these instructions, plastic bags, sample identification tags and a return address label.

a. Use the cold water kitchen tap or bathroom tap for obtaining your sample. **Allow the water to run for 3 to 5 minutes prior to taking the sample.**

b. **Do not rinse the bottle prior to sampling.** Fill the quart sample bottle with the water to be analyzed to within ½ inch of the top. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.

c. Fill out a sample identification tag for each system. **Include the system identification number if sampling from a public water system, date and time of sampling, point of collection (kitchen sink, etc.), source and your name as the sample collector.** This information is mandatory. If more than one sample is being mailed to the laboratory, please identify all samples and their tags in such a manner that all samples may be correctly identified prior to analysis. Place the sample tags in the zip-loc plastic bag and seal well. Use waterproof ink; non-waterproof ink will bleed if the tags become wet.

d. **Place the filled sample bottles in the large plastic zip-loc bags and seal before placing them in your shipping cartons.** This is to prevent any leakage that may occur during shipment from soaking through the outer container and damage other mail items.

For regulatory compliance reporting for alkalinity, conductivity, total dissolved solids and sulfate Add ice cubes to the remaining two zip-loc bags to maintain the sample temperature at 4°C and seal. To help the sample maintain the correct temperature please place the sample container between the bags of ice. If you did not receive a foam cooler please call the laboratory at 1-304-965-2694.

For compliance monitoring *the samples must be taken from the point of entry into the distribution system: at the plant finished water tap.*

For private well owners: *take the sample at the kitchen tap for testing of treated water if treatment exists (such as chlorination or softening) or take the sample at some point before treatment for testing of raw water.*

ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

West Virginia Department of Health and Human Resources
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Charleston, WV 25302
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INSTRUCTIONS FOR SAMPLING OF INORGANIC CONTAMINANTS TO MEET EPA COMPLIANCE MONITORING (SDWA)

HYDROGEN SULFIDE

Maximum holding time 7 Days

1. The kit consists of a brown plastic sample bottle, these instructions, plastic bags, sample identification tags, and a return address label.

2. Use the cold water kitchen tap or bathroom tap for obtaining your sample. **Avoid aeration during sampling**; if the faucet is fitted with an aerator, remove it before sampling. **Allow the water to run for 3 to 5 minutes prior to taking the sample.**

3. **Do not rinse the bottle prior to sampling** because it contains a small quantity of sample preservative (required by EPA). Fill the brown sample bottle with the water to be analyzed to within ½ inch of the top. Be sure the cap is tightened to prevent leakage during shipment to the laboratory.

4. Fill out a sample identification tag for each system. **Include the system identification number if sampling from a public water system, date and time of sampling, point of collection (kitchen sink, etc.), source and your name as the sample collector.** This information is mandatory. If more than one sample is being mailed to the laboratory, please identify all samples and their tags in such a manner that all samples may be correctly identified prior to analysis. Place the sample tags in the zip-loc plastic bag and seal well. Use waterproof ink; non-waterproof ink will bleed if the tags become wet.

5. **Place the filled sample bottle in the zip-loc bag and seal before placing it in your shipping carton. Add ice cubes to the remaining two bags to maintain the sample temperature at 4°C and seal.** This is to prevent any leakage that may occur during shipment from soaking through the outer container and damage other mail items. Please mark the outside of the container as being fragile.

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INSTRUCTIONS FOR SAMPLING OF INORGANIC CONTAMINANTS TO MEET EPA COMPLIANCE MONITORING (SDWA)

CYANIDE

Maximum holding time 14 Days

1. The kit consists of a small plastic sample bottle, these instructions, plastic bags, sample identification tags, a return address label and a small vial of 8M sodium hydroxide.
2. Use the cold water kitchen tap or bathroom tap for obtaining your sample. **Allow the water to run for 3 to 5 minutes prior to taking the sample.**
3. **Do not rinse the bottle prior to sampling** because it contains a small quantity of ascorbic acid that acts as a sample preservative (required by EPA). Fill the sample bottle with the water to be analyzed to within ½ inch of the top. **Invert the bottle several times to mix the sample thoroughly with the preservative.**
4. Next, carefully transfer the liquid contents of the sodium hydroxide vial into the sample bottle. Be sure the cap is tightened to prevent leakage during shipment to the laboratory. Invert the bottle several times to mix the sample thoroughly with the vial contents.
5. Fill out a sample identification tag for each system. **Include the system identification number if sampling from a public water system, date and time of sampling, point of collection (kitchen sink, etc.), source and your name as the sample collector.** This information is mandatory. If more than one sample is being mailed to the laboratory, please identify all samples and their tags in such a manner that all samples may be correctly identified prior to analysis. Place the sample tags in the zip-loc plastic bag and seal well. Use waterproof ink; non-waterproof ink will bleed if the tags become wet.
6. **Place the filled sample bottles in the zip-loc bags and seal before placing them in your shipping cartons. Add ice cubes to the remaining two zip-loc bags to maintain the sample temperature at 4°C and seal.** This is to prevent any leakage that may occur during shipment from soaking through the outer container and damage other mail items.

For compliance monitoring *the samples must be taken from the distribution system: from a customer's faucet. Refer to your district engineer for further sampling instructions.*

For private well owners *or general public customers: samples should be taken from the tap most frequently used to obtain water for drinking.*

MICROBIOLOGICAL TESTING

DIRECTIONS FOR BACTERIOLOGICAL SAMPLING

COLLECTING THE SAMPLE

1. Use only sterile sample bottle furnished by State or County Health Departments. These sample bottles have a six month shelf life after which they must be returned to the Office of Laboratory Services for reprocessing.
2. Do not touch the inside of the sample bottle or cap or otherwise contaminate outfit.
3. Do not collect from a storage tank, leaky faucet, aerators, or "purifiers".
4. Allow water to run for 5 minutes to clean service line before sampling.
5. Do not overflow or rinse sample bottle.
6. Fill sample bottle to the shoulder leaving about a 1 inch air space at the top.
7. Replace the sample bottle cap securely.

COMPLETING THE SAMPLE HISTORY - REPORT FORM

1. Complete all of the following information IN INK - make sure that all copies are legible.
2. Provide the following information:
   - A. County of water sample origin.
   - B. Public Supply (PWS) ID Number and name of water supply.
   - C. Who is to be charged for the sample examination?
   - D. Collector's name, title, certification number, organization, and telephone number.
   - E. To whom the final report of examination is to be mailed? (DO NOT WRITE "SAME AS ABOVE" - This information appears in a window envelope.)
   - F. Bottle Number.
3. Complete the following sample collection data:
   - A. Sample Type - Repeat Samples and Replacement Samples must have the complete lab number of the previous sample that they are a Repeat/Replacement for. (Repeat samples are for samples that were previously Total Coliform Positive and must include their source: Original Location, Upstream, Downstream or Other; Replacement Samples are for samples that were previously Not Reported: Unsatisfactory, Laboratory Accident or Invalid.)
   - B. Date and Time of sample collection. COLLECTOR MUST INITIAL THE FORM.
   - C. Give a specific description of the Sampling Point.
   - D. Is the Water Supply Chlorinated? Chlorine Residual.
   - E. pH.
   - F. How the sample is to be transported to the laboratory and the transportation condition.

MAILING - DELIVERY TO LABORATORY

1. Samples must be sent or brought for receipt to the laboratory in time for examination during the following hours (South Charleston Laboratory: 8:00 am to 4:30 pm, Monday thru Friday. Kearneysville Laboratory: 8:00 am to 4:00 pm Monday thru Wednesday and 8:00 am to 12:00 pm, Thursday) and within 30 hours after collection.
2. Check departure schedule of mail or delivery service from your area and plan for collections to be readied for shipment at that time.
3. Make sure postage is affixed to outer mailer.

ALL FIVE COPIES OF THE COMPLETED HISTORY FORM MUST BE ENCLOSED WITH THE SAMPLE.

SAMPLING CONTAINERS ARE THE PROPERTIES OF THE STATE AND THEIR USE IS RESTRICTED ONLY FOR THE COLLECTIONS BY STATE AGENCIES OR THOSE DULY AUTHORIZED BY THE STATE.

MICROBIOLOGICAL ANALYSIS RECORDS ARE DISPOSED OF AFTER 5 YEARS.

SDWA PRESERVATION AND HOLDING TIMES					
Parameter/Method	Preservative	Sample Holding Time	Extract Holding Time	Suggested Sample Size	Type of Container
Metals (except Mercury)	HNO_3 pH<2	6 months	NA	1 L	Plastic or Glass
Mercury	HNO_3 pH<2	28 days	NA	100 mL	Plastic or Glass
Cyanide	Cool, 4°C Ascorbic acid (if chlorinated) NaOH pH>12	14 days	NA	1 L	Plastic or Glass
Fluoride	None	1 month	NA	100 mL	Plastic or Glass
Nitrate (Chlorinated)	Cool, 4°C Non Acidified	14 Days	NA	100 mL	Plastic or Glass
Nitrate (Non Chlorinated)	Cool, 4°C Non Acidified	48 hours	NA	100 mL	Plastic or Glass
Nitrite	Cool, 4°C	48 hours	NA	100 mL	Plastic or Glass
(NO2 + NO3)-N	H_2SO_4 pH<2	28 days	NA	100 mL	Plastic or Glass

SDWA PRESERVATION AND HOLDING TIMES					
Parameter/ Method	Preservative	Sample Holding Time	Extract Holding Time	Suggested Sample Size	Type of Container
502.2	Sodium Thiosulfate or Ascorbic Acid, 4°C, HCl pH<2	14 days	NA	40-120 mL	Glass with PTFE Lined Septum
504.1	Sodium Thiosulfate Cool, 4°C	14 days	4°C, 24 hours	40 mL	Glass with PTFE Lined Septum
505	Sodium Thiosulfate Cool, 4°C	14 days (7 days for Heptachlor)	4°C, 24 hours	40 mL	Glass with PTFE Lined Septum
506	Sodium Thiosulfate Cool, 4°C Dark	14 days	4°C, dark 14 days	1 L	Amber Glass with PTFE lined cap
507	Sodium Thiosulfate Cool, 4°C Dark	14 days (see method for exceptions)	4°C, dark 14 days	1 L	Amber Glass with PTFE lined cap
508	Sodium Thiosulfate Cool, 4°C Dark	7 days (see method for exceptions)	4°C, dark 14 days	1 L	Glass with Teflon PTFE cap
508A	Cool, 4°C	14 days	30 days	1 L	Glass with PTFE Lined Cap
508.1	Sodium Sulfite HCl pH<2 Cool, 4°C	14 days (see method for exceptions)	30 days	1 L	Glass with PTFE Lined Cap
515.1	Sodium Thiosulfate Cool, 4°C Dark	14 days	4°C, dark 28 days	1 L	Amber Glass with Teflon lined cap
515.2	Sodium Thiosulfate or Sodium Sulfite HCl pH<2 Cool, 4°C Dark	14 days	≤4°C, dark 14 days	1 L	Amber Glass with PTFE lined cap
515.3	Sodium Thiosulfate Cool, 4°C Dark	14 days	≤4°C, dark 14 days	50 mL	Amber Glass with PTFE lined cap
515.4	Sodium Sulfite, Dark Cool ≤ 10°C for first 48 hr., ≤6°C there after	14 days	21 days at ≤0°C	40 mL	Amber Glass with PTFE lined Septum
524.2	Ascorbic Acid or Sodium Thiosulfate, HCl pH<2, Cool 4°C	14 days	NA	40-120 mL	Glass with Teflon lined Septum

SDWA PRESERVATION AND HOLDING TIMES					
Parameter/ Method	Preservative	Sample Holding Time	Extract Holding Time	Suggested Sample Size	Type of Container
525.2	Sodium Sulfite, Dark, Cool, 4°C HCl pH<2	14 days (see method for exceptions)	30 days from collection	1 L	Amber glass with Teflon lined cap
531.1, 6610	Sodium Thiosulfate, Monochloroacetic acid pH<3, Cool, 4°C	Cool, 4°C 28 days	NA	60 mL	Glass with PTFE Lined Septum
531.2	Sodium Thiosulfate, Potassium Dihydrogen Citrate buffer to pH 4, dark, ≤10°C for first 48 hr., ≤6°C there after	28 days	NA	40 mL	
547	Sodium Thiosulfate Cool, 4°C	14 days (18 mo. frozen)	NA	60 mL	Glass with PTFE Lined Septum
548.1	Sodium Thiosulfate (HCl pH 1.5-2 if high biological activity) Cool, 4°C, Dark	7 days	14 days ≤ 4°C	≥ 250 mL	Amber Glass with Teflon lined Septum
549.2	Sodium Thiosulfate, (H_2SO_4 pH<2 if biologically active) Cool, 4°C Dark	7 days	21 days	≥ 250 mL	High Density Amber Plastic or Silanized Amber Glass
550, 550.1	Sodium Thiosulfate Cool, 4°C HCl pH<2	7 days	550, 30 days 550.1, 40 days Dark 4°C	1 L	Amber Glass with Teflon lined Cap
551.1	Sodium Sulfite, Ammonium Chloride, pH 4.5-5.0 with Phosphate buffer, Cool 4°C	14 days	NA	≥40 mL	Glass with Teflon lined Septum
552.1	Ammonium Chloride, Cool, 4°C Dark	28 days	≤4°C, dark 48 hours	250 mL	Amber Glass with Teflon lined Cap
552.2	Ammonium Chloride, Cool, 4°C Dark	14 days	7 days at ≤ 4°C, dark or 14 days at -10°C, dark	≥ 50 mL	Amber Glass with Teflon lined Cap
555	Sodium Sulfite HCl pH≤2 Dark, Cool 4°C	14 days	NA	≥ 100 mL	Glass with Teflon lined Cap
1613B	Sodium Thiosulfate Cool, 0-4°C, Dark		Recommend 40 days	1 L	Amber Glass with PTFE lined Cap

APPENDIX G

ENVIRONMENTAL CHEMISTRY LABORATORY
RECEIVING AND LOGGING-IN SAMPLES

RECEIVING SAMPLES:

Samples can be received from many sources: U.S. Postal Mail, U.P S. Delivery, Office of Laboratory Services (OLS), and Walk-In Hand Delivered, etc. The sample should be checked to make certain the testing requested is performed in this laboratory. An Identification Card/Tag should accompany each sample.

1. **SAMPLE REJECTION POLICY:** It is the policy of this laboratory to reject any sample submitted for compliance analysis if criteria for sampling (as mandated by EPA methods used within this lab) are not met. This may include but is not limited to:
   - **1.1.** Bottle leaking
   - **1.2.** Improper container
   - **1.3.** Improper preservation (when required)
   - **1.4.** Exceeding required holding time
   - **1.5.** No name or address (unless sent in by sanitarian or district engineer)
   - **1.6.** No date/time for collection

If a phone number is provided, a call will be made to get the required information. If information cannot be corrected by phone, a report is sent stating why sample was unsatisfactory and asked to resubmit the samples.

2. **SAMPLE I.D. CARD/TAG:**
   - **2.1.** **The Front of the I.D. Card** (see attachment 1) should be filled out with all requested information:
     - **2.1.1.** County sample collected
     - **2.1.2.** PWS ID NO. (When applicable)
     - **2.1.3.** Public or private system
     - **2.1.4.** Name of System or Owner and Mailing address
     - **2.1.5.** Bill To - Name and Address
     - **2.1.6.** Telephone number
     - **2.1.7.** Point of collection
     - **2.1.8.** Date/time of collection (necessary for compliance samples and samples with holding time)
     - **2.1.9.** Name and title of collector
     - **2.1.10.** Type of water
     - **2.1.11.** Is water chlorinated?
     - **2.1.12.** Source of water
     - **2.1.13.** Purpose of sample
     - **2.1.14.** Laboratory #
     - **2.1.15.** Date Received
     - **2.1.16.** Initials of person logging in sample

   - **2.2. Back Of I.D. Card** should be check by person logging-in sample:
     - **2.2.1** Chain of Custody

2.2.2. Shipping requirements (mailed, hand delivered)
2.2.3. Preservative Added
2.2.4. To be shipped/received on Ice
2.2.5. Approved container
2.2.6. Required volume
2.2.7. List of analytical testing available

2.3. **After logging-in the sample** make a copy of both sides of I.D. Card, attach card to sample. The copy should be kept on file to copy on back of completed lab report.

3. **NUMBERING A SAMPLE:** Sometimes several containers are filled from one source so that different tests can be performed. If all the information is identical (point of collection, date, time, raw or treated source for a specific name), the samples can have the same lab number. When a sample is received check Log-In-Book for next laboratory number, stamp assigned number on the sample I.D. Card, and stamp date received. Person logging sample needs to sign initials.
3.1. Example for first sample of each year: 050001 (05 for current year)
3.2. Lab number for Nitrate/Nitrite should be written on the bottle lid.

4. **SAMPLE RECEIVED WITH PAYMENT:** When a payment is received with sample(s) the check, invoice, and a receiving slip is sent to OLS Fiscal Inventory & Management Section. The receiving slip is signed and returned back to Big Chimney. Copy of the check, invoice and receiving slip are stapled together and kept on file by year, under checks forward to OLS. Form for invoices (listing tests requested and charges) and receiving slip (listing person's signature sending check to OLS, check information, and person signature at OLS that received check and returns form back to Big Chimney Laboratory) are stored on computer shared file labeled sample payment forms.

4.1. The check is to be credited, by Fiscal, O.L.S., on the customer's account for the tests charged.

4.2. The invoice (to the billing office) states: (see attachment 3)
4.2.1. Date
4.2.2. Customer's name
4.2.3. Mailing address
4.2.4. Charge for requested tests

4.3. **THE RECEIVING SLIP** (to be returned from OLS Fiscal Inventory & Management) shows: (see attachment 2)
4.3.1. Date invoice is sent to OLS
4.3.2. Customer's name
4.3.3. Check number
4.3.4. Date of check
4.3.5. Check amount
4.3.6. Lab report number
4.3.7. Signature of person sending the check to OLS from Big Chimney Laboratory
4.3.8. Signature of the person receiving the check at OLS and returning form back to Big Chimney Laboratory.

5. **SAMPLE FOR SANITARY SURVEY/PLANT REVIEW**: These samples are sent from District Engineers from the District Offices. There is no charge for these samples. These test requested may vary depending on the decision of the District Engineer.

6. **SAMPLE FOR LAB PURE OR DISTILLED WATER:** These samples on De-ionized water are sent from Laboratories Certified for Microbiology testing. The laboratories are not charged for the tests, its part of the Certification program. The tests include Cadmium, Chromium, Lead, Copper, Nickel, and Zinc.

7. **SAMPLES FROM OFFICE OF ENVIRONMENTAL HEALTH SERVICES (OEHS), ENVIRONMENTAL RESOURCE SPECIALIST (E.R.S.):** These samples are usually for lead testing in private homes. The location of the collection is confidential. The sample has a number given by the collector to identify the sample and is accompanied by a "Chain of Custody Form".
   7.1. The original Chain of Custody Form is mailed with the lab report to OEHS, attention of collector with the person's name that has accepted the sample at the lab. A copy of the Chain of Custody Form is attached to the original lab report and filed.

8. **LOG-IN-BOOK:** Write sample information in Log-In-Book. (Information can also be typed in the Log Book on computer located on the share file. See attachment 4).
   8.1. Date sample collected/received
   8.2. County sample collected
   8.3. Number of same sample bottles received
   8.3. Name an address of owner or water system (responsible party for billing)
   8.4. List analytical testing and charges

9. **LAB REPORT:** Type lab report on computer for analysts to record results (see attachment 5)
   9.1. Form located on shared file drive
      10.1.1. Lab form – lab report to be used for testing of samples for drinking water
   9.2. Save lab report information on shared drive; by year – month received – lab report number.

APPENDIX G
ATTACHMENT ONE

SAMPLE IDENTIFICATION CARD/TAG

Laboratory #: _____ Int: _____
Date: _____

County: _____ PWS ID No._____
☐ Public System ☐ Private System

Name of System or Owner: _____
Address: _____
City/State _____ Zip Code: _____
(If different)
Bill To-Name: _____
Address: _____
City/State: _____ Zip Code: _____

Date of Collection: _____ Time of Collection: _____
Point of Collection: _____

Name of Collector: _____ Phone No.: _____
Collectors Title: ☐District Engineer ☐Sanitarian ☐Operator ☐Owner

Type of Water: ☐ Treated ☐ Raw ☐ Lab pure ☐ Other _____
Is this water Chlorinated? ☐ Yes ☐ No

Source of Water: ☐ Spring ☐ Well ☐ Impoundment ☐ River/Creek
☐ Purchased ☐ Other_____

Purpose of Sample: ☐ Regulatory Compliance ☐Complaint
☐ Customer Request ☐ Home Loan
☐ Sanitary Survey/ Plant Review ☐ Other_____

(BACK OF ID CARD/TAG)

PLEASE MARK THE ANALYSIS YOU REQUIRE

METALS	NON-METALS
☐Aluminum	☐*Alkalinity, Total
☐Antimony	☐Calcium
☐Arsenic	☐Calcium Hardness
☐Barium	☐Chloride
☐Beryllium	☐Chlorine, Free
☐Cadmium	☐Chlorine, Total
☐Chromium	☐*Conductivity
☐Copper	☐*Cyanide, Free
☐Iron	☐Fluoride
☐Lead	☐*Hydrogen Sulfide
☐Manganese	☐Magnesium
☐Mercury	☐*Nitrate/Nitrite
☐Nickel	☐*Nitrite
☐Selenium	☐*Nitrate
☐Silver	☐*Orthophosphate
☐Sodium	☐*pH
☐Thallium	☐*Sulfate
☐Zinc	☐*TDS
	☐Total Hardness
	☐*Turbidity

Laboratory Use Only

Chain of Custody Received
☐ Yes ☐ No

Shipping Requirements
☐ Mail
☐ Overnight
☐ Hand Delivered

Preservative Added
☐ Yes ☐ No

To be shipped on ICE
☐ Yes ☐ No

Received on ICE @ ≤ 4°C
☐ Yes ☐ No

Approved Container
☐ Yes ☐ No

Required Volume
☐ Yes ☐ No

* These analytes require special sample bottles and preservatives please contact the laboratory
Note: Please remember that metals and non-metals are to be sampled in two separate bottles

APPENDIX G
ATTACHMENT TWO

CHECK FORWARDED/RECEIVED FORM

WV BUREAU FOR PUBLIC HEALTH, OLS
ENVIRONMENTAL CHEMISTRY LABORATORY
4710 CHIMNEY DRIVE, SUITE G
CHARLESTON, WEST VIRGINIA 25302

DATE:

TO:
Fees For Services
O.L.S.

FROM: Environmental Chemistry
Big Chimney

CHECK BEING FORWARDED TO YOUR ATTENTION

CHECK DATE: _____ FROM: _____
AMOUNT : _____ CHECK NO: _____
LAB REPORT NO: _____

FORWARDED BY: _____

RECEIVED BY: _____.

CHECK FOR LABORATORY CERTIFICATION FEE
FORWARDED/RECEIVED FORM

WV BUREAU FOR PUBLIC HEALTH, OLS
ENVIRONMENTAL CHEMISTRY LABORATORY
4710 CHIMNEY DRIVE, SUITE G
CHARLESTON, WEST VIRGINIA 25302

DATE:

TO:
Fees For Services
O.L.S.

FROM: Environmental Chemistry
Big Chimney

CHECK BEING FORWARDED TO YOUR ATTENTION

CHECK DATE: _____ FROM:_____
AMOUNT: _____ CHECK NO:_____
For: Certification Fee
Copy of Check To: _____

FORWARDED BY:_____

RECEIVED BY: _____.

APPENDIX G ATTACHMENT THREE
INVOICE FOR TESTING SERVICES

West Virginia Department of Health and Human Resources
Office of Laboratory Services
ENVIRONMENTAL CHEMISTRY LABORATORY SECTION
4710 Chimney Drive, Suite G, Charleston, West Virginia 25302

TO: _____ DATE: _____

_____

_____

Number of Test Requested	Parameter to be Tested For	Cost Per Test	Cost Extension
_____	Aluminum	$ 14.00	$ _____
_____	Alkalinity	$ 10.00	$ _____
_____	Antimony	$ 14.00	$ _____
_____	Arsenic	$ 14.00	$ _____
_____	Barium	$ 12.00	$ _____
_____	Beryllium	$ 14.00	$ _____
_____	Cadmium	$ 14.00	$ _____
_____	Calcium (by Titration)	$ 15.00	$ _____
_____	Calcium Hardness	$ 10.00	$ _____
_____	Chromium	$ 14.00	$ _____
_____	Chloride	$ 15.00	$ _____
_____	Chlorine, Free	$ 12.00	$ _____
_____	Chlorine, Total	$ 12.00	$ _____
_____	Conductivity	$ 10.00	$ _____
_____	Copper	$ 14.00	$ _____
_____	Cyanide	$ 9.00	$ _____
_____	Fluoride	$ 15.00	$ _____
_____	Hydrogen Sulfide	$ 15.00	$ _____
_____	Iron	$ 15.00	$ _____
_____	Lead	$ 14.00	$ _____
_____	Magnesium	$ 12.00	$ _____
_____	Manganese	$ 15.00	$ _____
_____	Mercury	$ 25.00	$ _____
_____	Nickel	$ 14.00	$ _____
_____	Nitrate	$ 15.00	$ _____
_____	Nitrite	$ 15.00	$ _____
_____	Nitrate/Nitrite	$ 15.00	$ _____
_____	pH	$ 9.00	$ _____
_____	Potassium	$ 12.00	$ _____
_____	Selenium	$ 14.00	$ _____
_____	Silica	$ 15.00	$ _____
_____	Silver	$ 14.00	$ _____
_____	Sodium	$ 15.00	$ _____
_____	Sulfate	$ 15.00	$ _____
_____	Thallium	$ 14.00	$ _____
_____	Total Dissolved Solids	$ 13.00	$ _____
_____	Total Hardness	$ 10.00	$ _____
_____	Turbidity (NTU)	$ 12.00	$ _____
_____	Zinc	$ 15.00	$ _____
_____	Other	$ _____	$ _____
_____	TOTAL FOR ALL TESTS		$ _____

RECEIVING AND LOGGING-IN FLUORIDE SAMPLES

Public Water Supplies and Health Department Fluoride Samples

Fluoride samples received into the Environmental Chemistry Laboratory for the Water Fluoridation Program are taken to the fluoride section of the laboratory and each sheet of the four part fluoride form is stamped with the date received.

When the analysis is complete the results are written on the top white copy of the form (see attachment four) and results are then entered into the fluoride data base. The four part form is separated, top white copy is filed and kept at the Environmental Chemistry Laboratory, yellow white copy is sent to Office of Environmental Health Services, pink copy is sent to Office of Laboratory Services South Charleston for billing, and the last white copy is mailed back to the facility or individual requesting fluoride testing. There is a charge for fluoride testing for Public Water Supplies.

Fluoride bottles and test forms are provided by the Environmental Chemistry Laboratory and may be obtained by calling, faxing or emailing a request form to the laboratory.

Pediatric Fluoride Samples

Fluoride samples received into the Environmental Chemistry Laboratory for the Pediatric Fluoride Program are taken to the fluoride section of the laboratory and each sheet of the two part fluoride form is stamped with the date received.

When analysis is complete the results are written on the top white copy of the form (see attachment four) and results are entered into the fluoride data base. Results are also entered into the fluoride mapping data base to help determine areas of need for fluoridation. The form is then mailed to Maternal, Child and Family Health at the Diamond Building. There is no charge for pediatric fluoride testing.

Pediatric fluoride kits may be obtained by calling the Maternal, Child and Family Health Warehouse. County Health Departments and Dentists can receive fluoride kits from Maternal, Child and Family Health after signing a letter of intent not to charge for pediatric fluoride testing performed by the Environmental Chemistry Laboratory. Individuals must contact their Dentist or County Health Departments in order to receive pediatric fluoride kits.

ENVIRONMENTAL MICROBIOLOGY WATER SAMPLE COLLECTION & HANDLING

1.0 Introduction -

Sample Handling is a critical aspect of the examination process. Without maintaining sample integrity, test results are meaningless. This section deals with all aspects of sample handling for the Water Program. Discussions will be included on Sampler Training, Sample Scheduling, Sample Collection, Transportation, Sample Accession, Storage and Disposal.

2.0 Training for Samplers -

2.1 Water samples are received from water plant operators, district engineers, county and state sanitarians, contracting firms, business owners and private individuals. To submit samples for Compliance (compliance with the Safe Drinking Water Act), and individual must have at minimum a Class 1-D Operators License. Training is provided in the following manner:

2.1.1 Water Plant Operators - Receive training at the Water Plant Operators Course held at the Environmental Training Center in Ripley, WV.

2.1.2 District Engineers - Receive on-the-job training.

2.1.3 County and State Sanitarians - Receive training at the Sanitarian Training Course held at the Office of Environmental Health Services. They also receive on-the-job training.

2.1.4 Business Owners - People that own establishments that have their own wells that serve the public must receive training from the Office of Environmental Health Services, Environmental Engineering Division.

2.1.5 Contracting Firms and Private Individuals - Receive no formal training but are provided detailed instructions on the back of the Water Bacteriological Report Form.

3.0 Sample Scheduling

Water samples for compliance purposes are submitted based on schedule setup by the Office of Environmental Health Services - Environmental Engineering Division. Other types of water samples are not scheduled. Clients are discouraged from submitting samples on Weekends.

4.0 Sample Collection

4.1 Water samples are to be collected only in vessels supplied by the Office of Laboratory Services. There are two types of collection vessels used - a 4 oz. nalgene bottle that is laboratory processed and reused and clear, disposable vessels provided by IDEXX. Only by special permission of the section supervisor may another type of bottle be used.

4.2 Collection vessels are mailed out to clients of the Office of Laboratory Services by the Container Section. Collection vessels may also be picked up in person by stopping by the laboratory.

4.3 Sample collection must be performed as described in Attachment #2.

4.4 After sample collection, the Water Bacteriological Report Form (EM-1) Attachment #3 is to be completed as described in Attachment #4.

5.0 Sample Accession –

5.1 90% of samples are picked up from the South Charleston Post Office by maintenance personnel and delivered to the General Reporting Office where the samples are sorted according to the appropriate laboratory sections. Samples that are shipped to the laboratory by other couriers (UPS, FedEx or DHL) are delivered to the Fiscal and Inventory Management Section and then delivered to Environmental Microbiology. Samples are also brought in to the laboratory by clients and left at the front desk throughout the day. The receptionist notifies the section each time samples are left at the front desk.

5.2 Upon receipt by the Environmental Microbiology Section the samples are sorted according to Test Method and Sample Codes. See Attachment #10 for a list of Test Methods and Sample Codes and Attachment #11 Test Method Chart. Sample vessels are set on top of the water bacteriological report form (they must be kept together). A three digit number sticker is placed on top of the sample vessel (the last three digits of the 5 digit laboratory number) and the water bacteriological report form is stamped with the laboratory number and date received. The water bacteriological report from is then marked with the test method, time received, initials of analysts receiving samples, analysis date and time and initials of analysts performing the analysis.

5.3 Water bacteriological report forms are then entered into the computer using Microsoft Access. The following fields are entered:

- 5.3.1 Lab Number
- 5.3.2 Test Method and Sample Code
- 5.3.3 County of Origin
- 5.3.4 Date of Collection, Receipt and Analysis
- 5.3.5 Supply
- 5.3.6 Mailing Address
- 5.3.7 Collector
- 5.3.8 Public Water Supply ID Number
- 5.3.9 Sampling Point
- 5.3.10 Compliance, Special Purpose or Repeat

5.4 The data base is used for printing the daily worksheets, locating samples for phone inquiries and compiling monthly reports.

5.5 Water samples will not be analyzed for any of the following reasons:

- 5.5.1 Exceeded Time (30 hours for compliance with the SDWA and samples requiring counts, 48 hours for all others)
- 5.5.2 Sample Contains < 100 mL
- 5.5.3 Insufficient Information (No date and time of collection or no phone number)
- 5.5.4 Sample contains residual chlorine

5.5.5 Insufficient air space to facilitate mixing
5.5.6 Unauthorized Collector

5.6 For any samples not analyzed, a replacement sample is requested.

6.0. Sample Storage

Water samples are analyzed immediately upon sample accession unless they are received at 4:30 pm. Samples received at 4:30 pm are stored in a wire basket in the sliding door refrigerator located in the Milk Room at 0.0 - 4.4°C (as long as the holding times will not be exceeded); unless the holding time will expire by the next morning or results are needed the next day as in the case of a "Boiled Water Advisory", then those sample will be analyzed up until 4:30 pm using Colilert 18. All samples analyzed after 1:30 pm are by Colilert 18.

7.0 Sample Disposal

7.1 Excess water from water samples (sample remaining after use of 100 mL for analysis) is collected in wax buckets and disposed of down the sink unless sewage is suspected in which case the remaining sample is left in the vessel and is taken to the Media/Glassware Section for autoclaving .

7.2 All multi tube fermentation tests (100 mL, 10 tube and dilutions), are taken to the Media/Glassware Section for autoclaving and reprocessing.

7.3 Negative Colilert 100 mL samples are poured down the sink and the vessels disposed of in the hard trash.

7.4 Positive Colilert 100 mL samples have > 2mL of bleach added to them, mixed, and left overnight, then poured down the sink and the vessels disposed of in the hard trash.

7.5 Quanti Trays are placed into autoclave bags and taken to the back autoclave for disposal.

7.6 HPC plates are placed into autoclave bags and taken to the back autoclave for disposal.

7.7 Nalgene sample vessels are taken to the Media/Glassware section for washing, autoclaving and reprocessing.

APPENDIX G
ATTACHMENT 4

LABORATORY

REPORT FORMS

WEST VIRGINIA Department of
Health &
Human Resources
BUREAU FOR PUBLIC HEALTH

OFFICE OF LABORATORY SERVICES
ENVIRONMENTAL CHEMISTRY LABORATORY
4710 Chimney Drive, Suite G, Charleston, WV 25302
Phone: 1-304-965-2694 FAX: 1-304-965-2696

Laboratory Number | Date Received: | County | Public Water System Identification: ( )

System/Owner Name: | Bill To: | Name of Collector | ( )
Attention | Attention: | Phone Number | Date/Time of Collection:
Address: | Address: | Collection Point:
City/State: | City/State: | Type of Water: | Source of System:
ZipCode: | ZipCode: | Purpose of Sample | Sample Received:

Sample Preservation Code (PC): [1] None, [2] Nitric Acid to pH<2, [3] Sulfuric Acid to pH<2, [4] Ice, [5] Zinc Acetate, [6] Other

REGULATED PRIMARY CONTAMINANTS

PC	CONTAMINANT	Results (mg/L)	Analyst	Date	MCL (mg/L)	MRL (mg/L)	MDL (mg/L)	Method Number	PC	CONTAMINANT	Results (mg/L)	Analyst	Date	MCL (mg/L)	MRL (mg/L)	MDL (mg/L)	Method Number
	Antimony				0.006	0.003	0.00084	SM3113B		Selenium				0.05	0.002	0.001	SM3113B
	Arsenic				0.05	0.002	0.00062	SM3113B		Thallium				0.002	0.002	0.0006	EPA200.9
	Barium				2.00	0.005	0.00033	EPA200.7		Fluoride				* 2.0 | 4.0	0.1	0.005	EPA300.0
	Beryllium				0.004	0.0002	0.00005	SM3113B		Nitrate - N				10.0	0.05	0.003	EPA353.2
	Cadmium				0.005	0.001	0.00012	SM3113B		Nitrite - N				1.00	0.05	0.002	EPA353.2
	Chromium				0.10	0.001	0.00048	SM3113B		Nitrate / Nitrite - N				10.0	0.05	0.003	EPA353.2
	Lead				** 0.015	0.001	0.00027	SM3113B		Cyanide, Free				0.2	0.05	0.002	SM4500CNF
	Mercury				0.002	0.0002	0.00003	EPA245.1									

REGULATED SECONDARY CONTAMINANTS

PC	CONTAMINANT	Results (mg/L)	Analyst	Date	SMCL (mg/L)	MRL (mg/L)	MDL (mg/L)	Method Number	PC	CONTAMINANT	Results (mg/L)	Analyst	Date	SMCL (mg/L)	MRL (mg/L)	MDL (mg/L)	Method Number
	Aluminum				0.05 | 0.2	0.003	0.002	SM3113B		pH (pH units) [2]				6.5 - 8.5	4.0	---	EPA150.1
	Chloride				250	2.0	0.01	EPA300.0		Silver				0.1	0.0005	0.00022	SM3113B
	Copper				** 1.3	0.001	0.00019	SM3113B		Sulfate [1]				250	2.0	0.01	EPA300.0
	Iron				0.3	0.05	0.013	SM3111B		Total Dissolved Solids [1]				500	----	----	SM2540C
	Manganese				0.05 [1]	0.02	0.004	SM3111B		Zinc				5.0	0.02	0.007	SM3111B

MISCELLANEOUS PARAMETERS

PC	CONTAMINANT	Results (mg/L)	Analyst	Date	MCL (mg/L)	MRL (mg/L)	MDL (mg/L)	Method Number	PC	CONTAMINANT	Results (mg/L)	Analyst	Date	Notification (mg/L)	MRL (mg/L)	MDL (mg/L)	Method Number
	Alkalinity, Total, as $CaCO_3$ [1]				----	1.0	----	SM2320B		Sodium				20	2.0	0.06	SM3111B
	Calcium Hardness, as $CaCO_3$				----	2.0	----	SM3500CaD		Magnesium				----	2.0	----	SM3500MgE
	Total Hardness, as $CaCO_3$				----	2.0	----	SM2340C		Nickel				----	0.002	0.00068	SM3113B
	Turbidity (NTU)				1 NTU [1]	0.2	----	EPA180.1		Chlorine, Free				----	0.2	----	SM4500CIG
	Conductivity				----	43	----	SM2510B		Chlorine, Total					0.2	----	SM4500CIG
	Hydrogen Sulfide				----	0.05	----	EPA376.1		Calcium					0.8	----	SM3500CaD
	Ortho-phosphate				----	0.1	----	EPA300.0									

* Sample >4°C, NOT VALID FOR SDWA COMPLIANCE REPORTING
2 Holding time was exceeded when sample was received, NOT VALID FOR SDWA COMPLIANCE REPORTING
[1] Notification level MCL = Maximum Contaminant Level MRL = Minimum Reporting Limit
** Action level SMCL = Secondary Maximum Contaminant Level MDL = Method Detection Limit

Remarks: **Metals Preserved in Laboratory**

PUBLIC WATER SUPPLIES AND HEALTH DEPARTMENT
FLUORIDE SAMPLE REPORTING FORM

Water Fluoridation Report

Public Water Supply Information

Supply: County:

P.W.S. Number: Water Plant Phone Number:

Sampling Point:

Date Collected:

Collected by: Title:

Water System Results (PPM):

Check Method: ☐ Specific Ion Method ☐ SPADNS

Mail Report to: *(address must be legible on all copies of report form for return)*

LABORATORY RESULTS

Fluoride Level (PPM):

Date Analyzed:

Analyst:

Comments:

☐ Exceeds maximum recommended level of 1.3.

☐ Below minimum recommended level of 0.8.

☐ Satisfactory

Optimum level of fluoridation is 1.0.

West Virginia Department of Health and Human Resources
Office of Laboratory Services – Environmental Chemistry Laboratory – Water Fluoridation Section
4710 Chimney Drive, Suite G, Charleston, WV 25302
Phone: (304) 965-2694 Fax: (304) 965-2696

PEDIATRIC FLUORIDE SAMPLE REPORTING FORM

Fluoride Test Report (Supplement Program)

Ages:			
Names of Children			Parent's Name (or guardian)
Address:			County:
City: Zip:			Phone:
This water is from: ☐ WELL / CISTERN ☐ OTHER			Test Result ☐☐.☐☐ ppm
Mail Report To:			
Address:			County:
City: Zip:			Phone:
Date Received	Lab No.	Analyst	Environmental Health Services Lab 1800 Washington Street Charleston, W. Va. 25305

REPORTING FORM FOR MICROBIOLOGY

CM-1
REV 9/03

WATER BACTERIOLOGICAL REPORT COUNTY OF ORIGIN:

NAME OF WATER SUPPLY P.W.S. I.D. #

NAME:

ADDRESS: CODE

CITY/STATE/ZIP:

COLLECTOR: TITLE: CERTIFICATION #:

COLLECTORS ORGANIZATION: PHONE:

SAMPLE TYPE:

- ❑ COMPLIANCE (SDWA): ❑ CWS ❑ NTNCWS ❑ TNCWS
- ❑ RAW (DILUTION'S REQUIRED) ❑ SURFACE ❑ GROUND
- ❑ SPECIAL PURPOSE
- ❑ REPLACEMENT FOR LAB.# ➤
- ❑ REPEAT FOR LAB#. ➤
  - ❑ REPEAT ORIGINAL ❑ REPEAT DOWNSTREAM
  - ❑ REPEAT UPSTREAM ❑ REPEAT OTHER:

- ❑ INDIVIDUAL HOUSEHOLD:
  - ❑ WELL
  - ❑ CISTERN
  - ❑ SPRING
- ❑ IS SUPPLY PROTECTED?
  - ❑ YES
  - ❑ NO

- ❑ POOL
- ❑ BEACH
- ❑ BOTTLED WATER ICE
- ❑ DAIRY FARM
- ❑ DAIRY PLANT
- ❑ OTHER:

REPORT TO BE MAILED TO:

NAME:

ADDRESS:

CITY/STATE/ZIP:

BOTTLE NUMBER:

SAMPLE COLLECTION: DATE: / / TIME: : ❑ AM ❑ PM COLLECTOR'S INITIALS

CHLORINATED? ❑ YES ❑ NO RESIDUAL: ❑ TOTAL ❑ FREE

pH

SAMPLING POINT

SAMPLE TRANSPORTATION: ❑ US MAIL ❑ UPS ❑ FEDEX ❑ AIRBORNE ❑ OTHER:
❑ HAND DELIVERED: ❑ BY COLLECTOR ❑ OTHER:

TRANSPORTATION CONDITION:
❑ PROTECTED FROM SUNLIGHT ❑ REFRIGERATED <10°C (50°F)

"DO NOT WRITE BELOW THIS LINE"

LAB NO. DATE REC'D

METHOD OF ANALYSIS:
- ❑ MUTLI TUBE FERMENTATION: SM 9221 B/E
- ❑ CHROMOGENIC/FLUOROGENIC SM 9223 B
- ❑ MEMBRANE FILTRATION: SM 9222 B / SM 9221 E
- ❑ HETERTROPHIC PLATE COUNT SM 9215 B

SAMPLE ANALYSIS:
DATE:
TIME: ❑ AM ❑ PM
ANALYSTS:
TEMP: °C

TIME REC'D: ❑ AM ❑ PM
REC'D BY: TEMP: °C

❑ *SAMPLES NOT EXAMINED DUE TO:
- ❑ EXCEEDED TIME ❑ INSUFF. VOLUME
- ❑ INSUFF. INFO. ❑ UNAUTH. COLLECTOR
- ❑ CONTAINED RESIDUAL CHLORINE
- ❑ INSUFF. AIR SPACE TO FACILITATE MIXING

LABORATORY RESULTS:

TOTAL COLIFORMS: ❑ PRESENT ❑ ABSENT PER 100mL
FECAL COLIFORMS: ❑ PRESENT ❑ ABSENT PER 100mL
E. COLI ❑ PRESENT ❑ ABSENT PER 100mL
HETEROTROPHIC PLATE COUNT: CFU/mL

❑ *INVALID DUE TO:
- ❑ TURBID ❑ COLOR INDETERMINATE ❑ TNTC ❑ CONFLUENT GROWTH ❑ PARTICULATE MATTER
- ❑ LABORATORY ACCIDENT ❑ *SEND REPLACEMENT SAMPLE

REMARKS: ❑ REPORTED ❑ FAXED TO: DATE REPORTED:

❑ NOT VALID FOR SDWA COMPLIANCE REPORTING DIRECTOR:

WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES
BUREAU FOR PUBLIC HEALTH / OFFICE OF LABORATORY SERVICES

*DO NOT REMOVE THIS TAB - USE FINE BALL POINT PEN OR TYPE
IMPORTANT THAT THE INFORMATION IS PLAINLY VISIBLE ON ALL COPIES
COMPLETE ALL APPLICABLE INFORMATION

S/1563
9/675

APPENDIX G
ATTACHMENT 5

LOG – BOOK
(EXAMPLE)

ENVIRONMENTAL CHEMISTRY LABORATORY
SAMPLE LOG-IN SHEET

LABORATORY NUMBER	MONTH / DAY / YEAR			Bottles Returned	COUNTY	NAME OF SYSTEM OR OWNER	Charge	No Charge	ANALYTES						
	SAMPLED	RECEIVED	COMPLETED												
050001															
050002															
050003															
050004															
050005															
050006															
050007															
050008															
050009															
050010															
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050015															
050016															
050017															
050018															
050019															
050020															

APPENDIX H
ENVIRONMENTAL CHEMISTRY DATA REPORT PROCEDURE

1. **SUPERVISOR'S REVIEW:** Upon completion of testing, the analysts will record results and will print lab report for supervisor review and signature. All compliance monitoring results that exceed the MCL must be cross-checked by a second analyst for calculation errors and initialed **before** forwarding to the supervisor.

2. **MAILING LAB REPORTS:** After the lab reports are signed, a copy is made to be filed in the office. The other copies and the original copy of the laboratory report are mailed out to the following, as instructed below. Information concerning where lab reports are mailed is recorded in Log-In-Book with the date. The last analyte sampled on a lab report is the date recorded as the completion date of sample.

2.1. Sample Results for **Sanitary Survey** sent by District Engineers are forwarded to:

2.1.1. FAX a copy to attention of District Engineer that collected the sample the original copy will be mailed to the District Office. (For address see Attachment 1)

2.1.2. Office of Environmental Health Services (OEHS)
Data Management
One Davis Square Suite 200
Charleston, WV 25301-1798

2.2. Sample Results for **Regulatory Compliance** are mailed to:

2.2.1. Customers will be sent the original laboratory report and a notice with report stating copies have been sent to Regulatory Compliance Agencies (attachment 2)

2.2.2. OEHS - Data Management

2.2.2.1. Elevated Nitrate, Nitrite Sample Results are FAXED within 24 hours to:

2.2.2.1.1. OEHS Compliance & Enforcement 304-558-5051

2.2.2.1.2. Data Management 304-558-0139

2.2.3. District Office for which area sample was collected.

2.2.4. Office of Laboratory Services (OLS), Fiscal Inventory & Management Section – (For billing purposes unless payment was received with sample)

2.3. Samples for the **Lead Abatement Program** in drinking water from OEHS Environmental Resources Specialist (ERS) are mailed to:

2.3.1. Original copy to:
WV Bureau for Public Health
Name of collector, E.R.S.
One Davis Square Suite 200
Charleston, WV 25301-1798

2.3.2. (OLS), Fiscal Inventory & Management Section – (For billing purposes unless payment was received with sample)

2.4. Original copy for sample results for **Lab Pure Water** is mailed to:
2.4.1 Laboratory that sent the sample

2.5. Samples **Collected by a County Sanitarian** but billed to the resident are mailed to:
2.5.1. Original copy to the customer
2.5.2. The county sanitarian
2.5.3. (OLS), Fiscal Inventory & Management Section – (For billing purposes unless payment was received with sample)

2.6. All **other** sample results are mailed to:
2.6.1. Original copy to the customer
2.6.2. Billing (Unless payment was received with sample)

3. FILING AND STORING REPORTS:

3.1. Before filing, information from completed copies of lab reports are used to prepared monthly reports.

3.2. Copy I.D. Card information on back of completed of lab report copy to be filed in office, before filing by year and county.

APPENDIX H
ATTACHMENT 1

WEST VIRGINIA BUREAU FOR PUBLIC HEALTH
OFFICE OF ENVIRONMENTAL HEALTH SERVICES

District Offices

(1) BECKLEY DISTRICT OFFICE
100 East Prince Street
Beckley, WV 25801
FAX 304-256-6672

(2) ST. ALBANS DISTRICT OFFICE
808 B Street; Suite G
Saint Albans, WV 25177
FAX 304-722-0615

(4) KEARNEYSVILLE DISTRICT
1948 Wiltshire Road, Suite 6
Kearneysville, WV 25430
FAX 304-725-3108

(5) WHEELING DISTRICT OFFICE
1060 Chapline Street, Suite 117
Wheeling, WV 26003
FAX 304-238-1002

(6) PHILIPPI DISTRICT OFFICE
209 South Main Street
Philippi, WV 26416
FAX 304-457-5571

APPENDIX H
ATTACHMENT TWO

West Virginia Department of Health and Human Resources

Office of Laboratory Services

ENVIRONMENTAL CHEMISTRY LABORATORY

4710 Chimney Drive, Charleston,
West Virginia 25302
Telephone No. 304-965-2694 FAX No. 304-965-2696

For your convenience:

Copies of your enclosed laboratory report(s) have been forwarded to the following agencies:

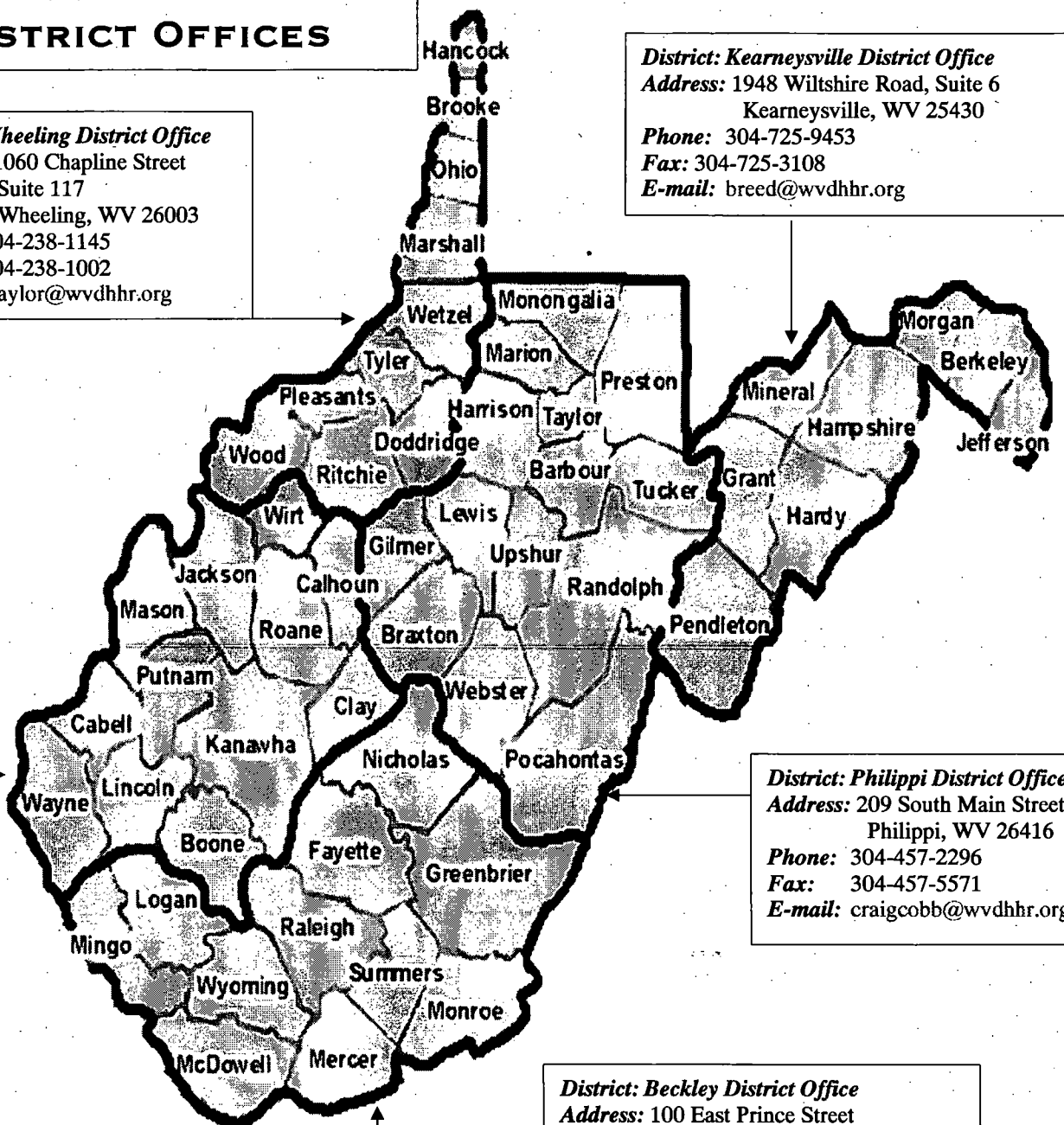
---

1. **Regulatory Development & Compliance**
   Located:
   West Virginia Bureau for Public Health
   Office of Environmental Health Services
   Capital and Washington Street
   1 Davis Square Suite 200
   Charleston, West Virginia 25301-1798

2. **Local District Office**
   Located: *(Mailed to the district office where sample is collected)*

   Beckley District Office
   Saint Albans District Office
   Kearneysville District Office
   Wheeling District Office
   Philippi District Office

Environmental Engineering Division District Offices



District: Wheeling District Office
Address: 1060 Chapline Street
Suite 117
Wheeling, WV 26003
Phone: 304-238-1145
Fax: 304-238-1002
E-mail: etaylor@wvdhhr.org

District: Kearneysville District Office
Address: 1948 Wiltshire Road, Suite 6
Kearneysville, WV 25430
Phone: 304-725-9453
Fax: 304-725-3108
E-mail: breed@wvdhhr.org

District: Philippi District Office
Address: 209 South Main Street
Philippi, WV 26416
Phone: 304-457-2296
Fax: 304-457-5571
E-mail: craigcobb@wvdhhr.org

District: Beckley District Office
Address: 100 East Prince Street
Beckley, WV 25801
Phone: 304-256-6666
Fax: 304-256-6672
E-mail: dblair@wvdhhr.org

District: St. Albans District Office
Address: 808 B Street, Suite G
St. Albans, WV 25177
Phone: 304-722-0611
Fax: 304-722-0615
E-mail: jddouglas@wvdhhr.org

CHEMISTRY MONTHLY REPORT FORMS

WEST VIRGINIA BUREAU FOR PUBLIC HEALTH
OFFICE OF LABORATORY SERVICES
ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

REPORTING PERIOD:

ANALYTICAL TOTALS
METALS ANALYSES

ANALYTE	NO. OF ANALYSES	NO. IN-HOUSE QC	NO. OF PT'S	TOTAL ANALYSES
Antimony				
Arsenic				
Barium				
Beryllium				
Cadmium				
Chromium				
Lead				
Mercury				
Selenium				
Thallium				
Aluminum				
Iron				
Manganese				
Sodium				
Copper				
Nickel				
Calcium				
Zinc				
Potassium				
Magnesium				
Silver				
Totals				

ANALYTICAL TOTALS
INORGANIC NON- METALS ANALYSES
REPORTING PERIOD:

ANALYTE	NO. OF ANALYSES	NO. IN-HOUSE QC	NO. OF PT'S	TOTAL ANALYSES
Fluoride				
Nitrate				
Nitrite				
Nitrate + Nitrite				
Alkalinity				
Chloride				
Chlorine,Free				
Chlorine,Total				
Conductivity				
Hardness, Calcium				
Hardnes,Total				
Hydrogen Sulfide				
pH				
O-Phosphate				
Total Phosphate				
Silica				
Sulfate				
TDS				
Turbidity				
Fluorsc. Dye				
Calcium via Hardness				
Foaming Agents				
Cyanide				
Totals				

WEST VIRGINIA BUREAU FOR PUBLIC HEALTH

OFFICE OF LABORATORY SERVICES
ENVIRONMENTAL CHEMISTRY LABORATORY

CHEMISTRY ANALYTICAL TOTALS FOR WATER ANALYSES
REPORTING PERIOD FOR:

Total number of water samples logged in for the reporting period:	
Total number of samples analyzed and reported during the reporting period:	

NO. OF ANALYTE SAMPLES ANALYZED	NO. OF IN-HOUSE QC SAMPLES ANALYZED	NO. OF PT SAMPLES ANALYZED	TOTAL OF ALL ANALYSES

WEST VIRGINIA BUREAU FOR PUBLIC HEALTH
OFFICE OF LABORATORY SERVICES
ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

CHARGE/NO CHARGE SAMPLES ANALYSES

REPORTING PERIOD FOR:

DISTRICT	NUMBER OF CHARGED ANALYTES SAMPLED	CHARGEABLE AMOUNT FOR SAMPLES		NUMBER OF NOT-CHARGED ANALYTES SAMPLED	AMOUNT FOR SAMPLES NOT CHARGED
(1) Beckley					
(2) Saint Albans					
(4) Kearneysville					
(5) Wheeling					
(6) Philippi					
TOTALS					

WEST VIRGINIA BUREAU FOR PUBLIC HEALTH

OFFICE OF LABORATORY SERVICES
ENVIRONMENTAL CHEMISTRY LABORATORY SECTION

FLUORIDE SECTION REPORT

REPORTING PERIOD:

SAMPLE DESCRIPTION	NUMBER ANALYZED
**PLANT SAMPLES	
SANITARIAN SAMPLES	
PEDIATRIC SAMPLES	
WET CHEMISTRY	
CDC PT'S	
QUALITY CONTROLS	
TOTAL	

** SAMPLES ARE BILLED

APPENDIX H

DATA HANDLING AND REPORTING FOR MICROBIOLOGY

Data produced by the Environmental Microbiology Laboratory Section is electronically recorded into a computer program called Safe Drinking Water Information System for West Virginia (SDWIS/WV) Safe Water Electronic Entry Tool (SWEET) PC which West Virginia purchased from Global Environmental Consulting Inc. (GEC). This computer information system allows data to be transmitted directly to the Office of Environmental Health Services (OEHS) Drinking Water Program. The GEC SWEET PC program is a tool created to assist the drinking water regulatory agency in managing data collected from water samples. This system improves data handling and validation of results. This data handling system was installed in 2003 and is administered by OEHS (EDD).

WEST VIRGINIA DEPARTMENT OF HEALTH & HUMAN RESOURCES
BUREAU FOR PUBLIC HEALTH
OFFICE OF LABORATORY SERVICES

ENVIRONMENTAL MICROBIOLOGY
MONTH YEAR

ANALYST	TITLE	WORK AREA	DATE EMPLOYEED/PROMOTED	COMMENTS

TECHNICAL ANALYST CERTIFICATIONS
F = Fully Certified C = Conditionally Certified P = Provisionally Certified N = Not Certified

	SM9221B	SM9223B	SM9222B	SM9215B	PAC	CC/HSCC	Delvo	Charm SL	SNAP	Paralilux	DMSCC	ESCC	ALP	PMC	SPC	Coliform

WATER SAMPLES		MILK SAMPLES & CONTAINERS	
Number of Samples	Number of Exams	Number of Samples	Number of Exams
Percent Change From Previous Month		Percent Change From Previous Month	
Percent Change From Previous Year		Percent Change From Previous Year	

LABORATORY CERTIFICATION PROGRAM

Date	Laboratory	Evaluated By	Previous Evaluation Date	Comments

PROFICIENCY TESTING

Date	Supplying Agency	Analytes	Test Methods/Codes	Analysts

EVENTS
Type: TP = Training Presentations Given C = Courses Attended SC = Seminars/Conferences Attended

Date	Event	Type	Location	Analyst

ADDITIONAL COMMENTS

WATER MONTHLY REPORT
PERIOD:

Total Samples
Total Exams

Supervisor:

		1 MF 100 mL	2 MTF 100 mL	3 Colilert 100 mL	4 MF Dilutions	5 MTF 10 Tube	6 MTF Dilutions	7 Colilert 51 Well	8 Colilert 97Well	9 HPC 1.0/0.1 mL
Public Water	**A**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Private Wells	**B**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Home Loans	**C**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Pools/Hot Tubs	**D**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Beaches	**E**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	E. coli +									
	E. coli >235									

	Invalid									
	UNSAT									
	LA									
Btl Water/Ice	**F**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Dairy Farm Water	**G**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Dairy Plant Water	**H**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Raw Surface Water	**I**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	>20,000									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
Raw Ground Water	**J**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Coliform >100									
	E. coli +									
	E. coli >20									
	Invalid									
	UNSAT									

	LA										
Raw Bottled Water	**K**										
	Total Rec'd										
	Analyzed										
	Coliform +										
	Coliform >100										
	E. coli +										
	E. coli >20										
	Invalid										
	UNSAT										
	LA										
Sewage Suspects	**L**										
	Total Rec'd										
	Analyzed										
	Coliform +										
	Fecal/E. coli +										
	Invalid										
	UNSAT										
	LA										
Disasters-Public	**M**										
	Total Rec'd										
	Analyzed										
	Coliform +										
	Fecal/E. coli +										
	Invalid										
	UNSAT										
	LA										
Disasters-Private	**N**										
	Total Rec'd										
	Analyzed										
	Coliform +										
	Fecal/E. coli +										
	Invalid										
	UNSAT										
	LA										
PT - MTF-100 mL	**O**										
	Total Rec'd										
	Analyzed										
	Coliform +										
	Fecal/E. coli +										
	Invalid										
	UNSAT										
	LA										
PT - Colilert-100 mL	**P**										

	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									
PT - MF-100mL	**Q**									
	Total Rec'd									
	Analyzed									
	Coliform +									
	Fecal/E. coli +									
	Invalid									
	UNSAT									
	LA									

APPENDIX I

CHAIN OF CUSTODY

Sample results that may be subject to a litigation should be handled under a ***chain-of-custody***. Requests for a ***chain-of-custody*** may be made to the laboratory and should be honored. Suggested procedures for a ***chain-of-custody*** are found in Appendix A of the ***Manual for the Certification of Laboratories Analyzing Drinking Water, Fifth Edition, January 2005***. A copy of that procedure follows.

CHAIN-OF-CUSTODY EVALUATIONS

1. Introduction

Written procedures for sample handling should be available and followed whenever samples are collected, transferred, stored, analyzed or destroyed. For the purposes of litigation, it is necessary to have an accurate written record to trace the possession and handling of samples from collection through reporting. The procedures defined here represent a means to satisfy this requirement.

1.1. A sample is in someone's "custody" if:

- 1.1.1. It is in one's actual physical possession;
- 1.1.2. It is in one's view, after being in one's physical possession;
- 1.1.3. It is one's physical possession and then locked up so that no one can tamper with it;
- 1.1.4. It is kept in a secured area, restricted to authorized personnel only.

2. Sample Collection, Handling and Identification

2.1. It is important that a minimum number of persons be involved in sample collection and handling. Guidelines established in standard manuals for sample collection preservation and handling should be used (e.g., EPA NPDES Compliance Sampling Inspection Manual, MCD 51, *Standard Methods for Examination Of Water and Wastewater).* Fields records should be completed at the time the sample is collected and should be signed or initialed, including the date and time, by the sample collector(s). If a witness is present at the time of collection, he/she should sign the section designated. A tamper-proof tape/label (supplied by the laboratory in the sample kit) should be affixed to the sample bottle at the time of collection. Field records should contain the following information: (see Appendix I - Attachment One for example of Chain of Custody)

- 2.1.1. Section I
  - 2.1.1.1. Attention to whom, office or company's name, address, and telephone number of location report is to be mailed.
  - 2.1.1.2. Reason for Sampling; litigation, compliance, or other
  - 2.1.1.3. Sampler's Signature
  - 2.1.1.4. Comments on collection of sample
- 2.1.2. Section II
  - 2.1.2.1. Number on sample bottle and identification tag should be the same.
  - 2.1.2.2. Station location or sampling point location
  - 2.1.2.3. Type of container
  - 2.1.2.4. Date and time of collection
- 2.1.3. Section III
  - 2.1.3.1. Sample Type; drinking water or raw water

2.1.3.2. Source of water; impoundment, purchased, well, river/creek, spring, or other source

2.1.3.3. Was the sample a composite (collected at more than one location) or grab sample (sample taken from one source at one time)

2.1.3.4. Preservation (if any used)

2.1.3.5. Number of containers used for sampling source

2.1.4 Section IV

2.1.4.1. Analyses requested

2.1.5. Section V

2.1.5.1. Signatures of person relinquishing and receiving the sample and the date/time.

2.1.6. Section VI Laboratory use only

2.1.6.1 Signature of person preparing/mailing sample kit to sampler (see Appendix I - Attachment Two for contents of sample kit)

2.1.6.2. Method of shipment and date/time sample kit was mailed out to sampler

2.1.6.3. Signature of person at laboratory receiving sample

2.1.6.4. Date and time sample was received in laboratory

2.1.6.5. Method of shipment when received in laboratory; UPS, hand delivered, US Postal certified, received etc.

2.1.6.6. Was sample received on ice?

2.1.6.7. Temperature of sample at time of receipt

2.1.6.8. Was tampering evident?

2.2. Each sample is identified by an identification (ID) tag with the same bottle number as on the sample container. The laboratory person mailing the kit should write on the bottle the test for collection and bottle number, especially when more than more bottle(s) must be filled at the same location to allow for ample amount of sample for all test(s) requested. The ID tag should be numbered with analytical parameter(s), requested for testing, checked on the back of ID tag to match each bottle container. (See an example of a sample identification tag Appendix G Attachment One.)

2.3. The closed filled sample container and ID tag should be placed in box and/or cooler, (when ice is required as a form of preservative) the chain-of-custody should be attached to the outside of the box in an envelope. All records should be filled out legally in waterproof pen.

2.3.1. Samples mailed on ice;

2.3.1.1. The cooler should be provided by the laboratory with zip-locked bags for the ice and instruction for packing the cooler.

2.3.1.2. The filled sample container (with tamper proof tape/label) should be place between two zip-locked bags of ice along with the ID tag in a separate, designated zip-locked bag, in the cooler.

2.3.1.3. Tamper proof evident tape/label (supplied by the laboratory) should be place around the cooler lid. Once the tape is cut open, the tape cannot be resealed.

2.4. The cooler should be place in the cardboard box/container and sealed with mailing tape for delivery with an address label.

2.4.1. Samples that do not require ice:

2.4.1.1. An tamper proof tape/label should be affixed to the filled sample container as instructed. The tape/label are broken when opened.

2.4.1.2. The filled sample container should be place into a zip-locked bag to prevent leaking along with the ID Tag in a separate, designated zip-locked bag (supplied by the laboratory).

2.4.1.3. The box should be sealed with a Evident tamper proof tape/label (supplied by the laboratory in the sample kit) and delivered along with the chain of custody.

3. Transfer of Custody and Shipment

3.1. When transferring the possession of the samples, the transferee must sign and record the date and time on the chain-of-custody record. Custody transfers, if made to a sample custodian in the field, should account for each individual sample, although samples may be transferred as a group. Every person who takes custody must fill in the appropriate section of the chain-of-custody record.

3.2. The field custodian (field sampler or collector) is responsible for properly packaging and dispatching samples to the appropriate laboratory for analysis. This responsibility includes filling out, dating, and signing the appropriate portion of the chain-of-custody record, and the identification tag (ID). A recommended chain-of-custody format is illustrated in Appendix I - Attachment One, see Appendix G - Attachment One for the ID tag.

3.3. All packages sent to the laboratory should be accompanied by the chain-of-custody record and other pertinent forms. A copy of these forms should be retained by the field custodian (either carbon or photocopy).

3.4. Mailed packages can be registered with return receipt requested. If packages are sent by common carrier, receipts should be retained as part of the permanent chain-of-custody documentation.

3.5. Samples to be transported must be packed to prevent breakage. If samples are shipped by mail or by other common carrier, the

shipper must comply with any applicable Department of Transportation regulations. (Most water samples are exempt unless quantities of preservatives used are greater than certain levels.) The package must be sealed to prevent tampering. Any evidence of tampering should be readily detected if adequate sealing devices are used.

3.6. If the field sampler delivers samples to the laboratory, custody may be relinquished to laboratory personnel. If appropriate personnel are not present to receive the samples, they should be locked in a designated area of the laboratory to prevent tampering. The person delivering the samples should make a log entry stating where and how the samples were delivered and secured. Laboratory personnel may then receive custody by noting in a logbook, the absence of evidence of tampering, unlocking the secured area, and signing the custody sheet.

4. Laboratory Sample Control Procedures

4.1. Sample control procedures are necessary in the laboratory from the time of sample receipt to the time the sample is discarded. The following procedures are recommended for the laboratory:

4.1.1. A specific person must be designated as custodian and an alternate designated to act as custodian in the custodian's absence. All incoming samples must be received by the custodian/alternate, who must indicate receipt by signing the accompanying custody/control forms and who must retain the signed forms as permanent records.

4.1.2. Once the sample is received in the laboratory, the custodian must log in the sample with a number in the logbook and maintain a permanent In-House Chain of Custody (see Appendix I - Attachment Three) to record the movement of each sample within the laboratory; who removes the sample from the custody area, when it was removed, when it was returned, and when it was destroyed.

4.1.3. A clean, dry, isolated room, building, and/or refrigerated space that can be securely locked from the outside must be designated as a "custody room."

4.1.4. The custodian must ensure that heat-sensitive samples, radioactive samples, or other sample materials having unusual physical characteristics, or requiring special handling, are properly stored and maintained prior to analysis.

4.1.5. Distribution of samples to the analyst performing the analysis must be made by the custodian.

4.1.6. The laboratory area must be maintained as a secured area, restricted to authorized personnel only.

4.1.7. Laboratory personnel are responsible for the care and custody of the sample once it is received by them and must be prepared to testify that the sample was in their possession and view or secured in the laboratory at all times from the moment it was received from the custodian until the time that the analyses are completed.

4.1.8. Once the sample analyses are completed, the unused portion of the sample, together with all identifying labels, must be returned to the custodian. The returned tagged sample must be retained in the custody room until permission to destroy the sample is received by the custodian.

4.1.9. Samples will be destroyed only upon the order of the responsible laboratory official when it is certain that the information is no longer required or the samples have deteriorated. (For example, standard procedures should include discarding samples after the maximum holding time has elapsed.) The same procedure is true for sample tags. The in-house chain of custody should show when each sample was discarded or if any sample tag was destroyed.

4.1.10. Procedures should be established for internal audits of sample control information. Records should be examined to determine traceability, completeness and accuracy.

4.1.11. The completed original laboratory report will be reviewed and signed by the Program Manager, mailed to the designated person/address on the chain of custody. The ID tag is photo – copied to the back of a copy of the lab report stapled to the copies of chain of custody and filed in the office of the laboratory.

4.2. The sample shall be kept in the secured area, until which time the custodian releases/destroys the sample.

(Section I)

CHAIN OF CUSTODY FORM

Report To: (Name) (Office/Co. Name)	(Street Address) (City/State/Zip)	Telephone No:
Reason for Sampling: (Explanation) ☐ Litigation ☐ Compliance ☐ Other	**Sampler(s) Signature:** (Office/Co. Name)	**Comments:**

(Section II) Sample Bottle/Tag Number	Station Location Or Sampling Point	Type of Container	Date Collected	Time Collected	*(Section III)* Sample Type: ☐ Drinking Water ☐ Raw Source of Water: ☐ Impoundment ☐ Purchased ☐ Well ☐ River/Creek ☐ Spring ☐ Other Comp / Grab. / Preservation	No. of Containers	*(section IV)* Analysis Requested

(Section V) **Relinquished by:** Signature	**Received by:** Signature	**Date/Time**
Relinquished by: Signature	**Received by:** Signature	**Date/Time**
Relinquished by: Signature	**Received by:** Signature	**Date/Time**
Relinquished by: Signature	**Received by:** Signature	**Date/Time**

(Section VI) ******** **For Laboratory Use Only** ********

Sample Kit Prepared/ Mailed To Sampler By: (Signature)	**Received for Laboratory by:** (Signature)	**Date/Time Received:**	**Method of Shipment:**
Date/Time Sample Kit Mailed: **Method Of Shipment to Sampler:**	**Received on Ice:** ☐ **Yes** ☐ **No**	**Temperature on Receipt:**	**Tampering Evident?** ☐ **Yes** ☐ **No**

Appendix I - Attachment Two

Chain of Custody Sample Kit Instructions

1. **Contents of sample kit:**
   - 1.1. **Sample bottle(s) (number of bottles depends on the analytical parameters requested for testing, and number of locations.)**
   - 1.2. **Zip-lock bag for each Sample bottle(s)**
   - 1.3. **Identification tag(s) for each sample bottle**
   - 1.4. **Zip-lock bag for ID tags**
   - 1.5. **Instructions for sample collection**
   - 1.6. **Chain of Custody Form**
   - 1.7. **Tamper proof evident tape/label for box/cooler**
   - 1.8. **Tamper proof evident tape/label for each sample bottle**
   - 1.9. **OLS, Environmental Chemistry mailing label**
   - 1.10. **Cooler (when sample(s) are required on ice)**
   - 1.11. **Zip-lock bags for ice (when required)**

APPENDIX I ATTACHMENT THREE
IN HOUSE CHAIN OF CUSTODY FORM

Sample Log No.	Date Received in Lab	Sample Custodian: (signature)	Stored Where:	Completed Report Mailed To: Date Mailed:
Relinquished by: Signature		Received by: Signature	Date/Time:	Reason:
Date Approved for Sample Disposal:			***Sample Disposed/Destroyed By:*** (signature)	***Date:***
Permission Given to Destroy Sample:By:	(Name)			
	(Title)		***Method of Disposal:***	
	(Address)			
Sample ID Tag:	Destroyed	Filed/Stored		

APPENDIX J

QUALITY ASSURANCE MONITORING

What is Quality Assurance Monitoring?

Quality Assurance (QA) is a process of monitoring the functional components of a system and correcting defects when unacceptable performance is identified. Quality assurance is important to every phase of the laboratory operation. Quality is assessed by naming specific indicators and setting targets or thresholds for acceptable performance and measuring customer satisfaction. The limits may be set so that action is taken only when the number of deficiencies reaches a certain specified threshold. In other words, a limit may be defined as a sentinel event that requires review and action when encountered.

Overall QA process involves three steps:

- Monitoring
- Problem solving
- Documentation

Monitors are data-collecting systems for the identification and documentation of problems which require solutions.

Monitors may or may not reflect problems. Monitoring may be an ongoing process of data collection with results compiled and evaluated on a routine basis.

What is monitored?

Quality Assurance Monitoring is a program to ensure that every phase of the testing process is monitored to produce the best possible test result. The program monitors the pre-analytical, analytical, and post analytical phases of the testing process.

Suggested Sample Tests Monitors:

PHASES	INDICATOR
Pre-Analytical	**Collection/Mailing Kit Contents, Proper Type Sample, Proper Sample Collection, Proper Packaging/Shipping, Transit Time, Date of Collection Information, Provider Name/Address, Sample Identification, Sample Adequacy**
Analytical	**Quality Control, Instrument/Equipment Maintenance & Calibration, Controlled Temperature Monitoring, Technical Procedure Manual, Test Verification, Evaluation Results**
Post Analytical	**Test Report Accurate, Test Report Legible, Report Addenda Intelligible, Reports Retrievable, Turn-around Time, Reports mailed to proper address**

Areas within the analytical phases that are important to the process but not directly related to the samples themselves are customer satisfaction, employee competency, and resource management. Measurement of these may be:

Customer Satisfaction: Telephone Calls, Written Letters/Notes, Questionnaires

Employee Competency: Employee Training, Performance Review, External PE, Studies, Competency Assessment

Resource Management: Workload, Budget, Order Turn-around Time, Accuracy of Supply Orders, Accuracy of Filling Order

How is monitoring performed?

Each section lead worker shall be responsible for establishing a QA monitoring system. The supervisor may assign to the testing personnel specific monitoring related to their job assignment.

Monitoring can be done daily as samples are received and processed. Some monitoring can be done by "batch" on a weekly basis. For example, from a computer print-out, a number of indicators can be monitored, such as turn-around time, transit time, unsatisfactory samples, accuracy of data-entry, and others.

The QA process involving monitors consists of six key elements:

1. Make a problem statement: e.g., "Providers are using the obsolete requisition form which has no collection date entry". Follow this with a positive statement which includes the target or threshold: "____% of providers will submit samples with the new requisition form." If no problem is recognized for the item to be monitored, make a positive statement, e.g.: "____% of specimens have patient name."
2. Collect data: Establish a monitor sheet, e.g., a log sheet is placed in the processing area to record data relating to the indicator being monitored;
3. Evaluate data: Establish a time period for monitoring and investigate the data at the end of the designated time;
4. Take action: Try to resolve the issue;
5. Evaluate effectiveness: Determine whether or not problem has been resolved;
6. Follow-up: Do spot checks, e.g. The problem will be considered resolved when three consecutive spot checks indicate that the threshold has been met.

EXAMPLE: Correction Result Reports

1. Make a problem statement: Since generation of computer reports there is more chance for error. Correction of errors may delay mailing of reports. What percentage of these errors are clerical and what percentage are are technical errors?
2. Establish a monitor: Place a log-sheet at the sign-out desk for documentation of all errors. Record date, type of error (technical or clerical) and persons involved in the error. Leave in place for one month before review of data.
3. Investigate data: Data may indicate, for instance that 80% of the errors are typing or clerical errors. Errors are divided evenly among technologists. Many errors involve the same computer codes.
4. Take action: Several computer mnemonics are changed to eliminate confusion. All personnel receive in-service education about the problem.
5. Evaluate effectiveness: After in-service, collect data for another month. Determine if percentage of errors is reduced and if still evenly distributed among technologists.
6. Follow-up: Spot check throughout the next several months to a year until three consecutive assessments show no increase in error rate or type.

These examples are fairly simple and straightforward. Some are more complex and may involve sections. If so, there must be cooperative effort to solve problems.

Evaluating the Data Derived from Monitoring

Evaluating the monitoring data should answer the question: "What levels, patterns, or trends are demonstrated by the data collected that indicate an opportunity for improvement or a problem of quality management that needs to be addressed?" In simple terms, the data shows what, if anything, needs correction or improvement.

In order to evaluate data, a standard must be established. Measurable criteria or standards by which monitors may be evaluated are called THRESHOLDS. Using a threshold as a yardstick for evaluating QA indicator data, is comparable to using rules for evaluating QC data at the bench, such as Westgard's rules.

Threshold is usually reported as percentage of variation, but other control parameters can be used, depending on the indicator used: standard deviation indices (SDI); turn-around time units; temperature ranges; case numbers, etc.

In establishing a threshold value, it is important to recognize that most medical processes have some variability that cannot be completely controlled. Striving for zero defects, while desirable, is unrealistic. (For a high-risk, sentinel event indicator, a zero percent tolerance of variation is warranted.)

Documentation of Quality Assurance

The Quality Feedback Form (QF Form) serves as the overall documentation form for the Quality Assurance Program. The form shown on the next page is a universal form for the documentation.

The QF Form may be used for: Problems, Accidents, Concerns, Complaints, Quality Concerns, Monitors and can be used to document and share information related to quality assurance. Other appropriate documentation is acceptable and may be more appropriate.

EPA regulations require that quality assurance documents be retained for at least five years. Each section should maintain a notebook or file of QF Forms that have been returned.

The Quality Feedback Form:

The Quality Feedback Form shown on the next page serves as a mechanism to collect information to improve the quality of services provided by the Office of Laboratory Services. Copies of completed forms will be reviewed at regularly scheduled QA meetings.

QUALITY FEEDBACK FORM (QFF)

Employee Name:_____Date:_____

Issue Category:
Customer Feedback
Sample Submission
Sample Result Generation
Sample Result Reporting
Other

Frequency of Occurrence:

This issue has occurred (Please Choose One)

Once

_____ times a (DAY) (WEEK) (MONTH)

Issue Impact:

This issue impacts (Please Choose One)

(One) (< 50%) (> 50%) (All) External Customers

One Person

Everyone in one lab

Everyone in an OLS building

Everyone in OLS

Issue Description:
Please provide an explanation of the issue. If this is related to customer feedback please provide copies of any documentation received from the customer (Letters, emails, etc.)

QUALITY ASSURANCE MANAGEMENT

Due to the small number of employees, the staff of the Environmental Chemistry Section will meet bimonthly or sooner to discuss quality assurance issues. A summary of the meeting will be kept and forwarded to the OLS Management (QM) Team.

Quality Management Team

The Office of Laboratory Services has a Management Team made-up of supervisors, administration and other persons as appointed. The Management Team will provide quality leadership to the OLS to facilitate good customer service and quality tests results. Minutes and information from the meetings will be shared with all employees and suggestions for improvement in laboratory operations will be solicited from all employees. The Management Team meetings will serve as the major communication mechanism between administration and staff.

Quality Assurance (QA) Committee

A Quality Assurance (QA) Committee will be established to periodically review quality assurance activities and to share quality information with laboratory staff. The QA Committee or section supervisor will also initiate system audits for peer review and assist with any needed corrective action.

Management Process

Quality Assurance monitoring is an active and on-going process that involves all employees and is facilitated by the administration, the QA Committee.

APPENDIX K

DATA REDUCTION, VALIDATION AND REPORTING

DATA REDUCTION:

Data reduction is performed by the individual analysts and consists of calculating concentrations in samples from the raw data obtained from the measuring instruments. The complexity of the data reduction will be dependent on the specific analytical method and the number of discrete operations (e.g., extractions, dilutions, and concentrations) involved in obtaining a sample that can be measured. The analyst will reduce or calculate all raw data into the final reportable values. Copies of all raw data and the calculations used to generate the final results, such as hardbound lab notebooks, strip-charts and chromatograms will be retained on file to allow reconstruction of the data reduction process at a later date.

After proper calibration, some instruments are able to produce data directly in reportable form. However, most instruments supply only a signal that must be interpreted and/or recorded by the analyst.

The signal produced by the instrument may be digital or analog. The digital response is documented directly into log books. Analog data may be in the form of chart recordings or chromatograms, which are converted, either electronically or manually by the analyst, to digital form and then documented. In either case, the analyst must still convert this signal to a final reportable form by either electronic calculator or computer.

DATA VALIDATION:

Before reporting any data onto the lab report forms, the analyst is responsible for verifying the accuracy of the standards by means of the QC check standard and the correlation coefficients. The overall accuracy of the method is evaluated by reviewing the matrix spike. The precision of the method is assessed by the duplicate.

If all data is within the control limits, the analyst continues with data reduction. If not, they must attempt corrective action or repeat the analytical run. The calculations are confirmed and documented by the analyst and entered into the appropriate logbook. The last responsibility of the analyst is to ensure that no mistakes have occurred in sample number or raw data. All data results for compliance monitoring samples that exceed the MCL must be cross-checked by a second analyst for calculation errors and initialed by the checker before reports are forwarded to the supervisor.

The laboratory supervisor is responsible for reviewing all logbooks to ensure that the analysts are fulfilling their responsibilities. It is also the responsibility of the laboratory supervisor to periodically review the finished bench sheets for anomalous values and over all balance.

DATA REPORTING:

For data reporting, rounding will not be performed until after the final result is obtained to minimize rounding errors, and results will not normally be expressed in more than two (2) or three (3) significant figures. All results will be reported with the proper measurement units (e.g., mg/l, µg/l.etc.).

Significant figures

All reported analytical values should contain only figures which are known to be reasonably reliable. Significant figures consists of all digits that are definitely known and one last digit which is estimated. Significant figures reflect the limits in accuracy (reliability) of the particular method of analysis and measuring instruments. Once the number of significant figures obtainable from a type of analysis is established data resulting from such analyses are reduced and reported according to scientific rounding rules.

DATA STORAGE:

All currently active logbooks are kept in safekeeping by the analysts responsible for those parameters. All lab report forms are filed upon completion, by county and year in the laboratory. After two years within the office's file cabinet, the report forms are transferred to boxes for future reference and to make room for current report forms. Retired log books are placed in file cabinets along with strip charts, QC charts, etc. that would allow complete reconstruction of an analysis. Log Books are cataloged and maintained for a minimum of twelve years.

While EPA has no specific regulation for quality assurance documents, section 8 of Chapter IV, Cert. Man., covers data retention times (10 years for compliance samples, 12 years for Lead and Copper, all data should be easily accessible for at least 5 years).

APPENDIX L

PREVENTIVE MAINTENANCE

The person named by the laboratory director/section supervisor as having primary responsibility shall determine from the manufacturer's manual for each piece of equipment what maintenance procedures shall be recorded in notebooks kept for that instrument.

Should the instrument require service, the laboratory director/section supervisor or Program Manager should be notified. Preventive maintenance and repairs will be outlined and documented by the person responsible for the instrument.

APPENDIX M

INTERNAL QUALITY CONTOL CHECKS AND FREQUENCY OF THEIR USE

For the analysis of contaminants by atomic absorption, ion chromatography, ICP, the Technicon Auto Analyzer, and specific ion electrode, a method blank is run with each set. Quality Control Standards are run according to the recommendations specified by each method.

A quality control check sample is analyzed for all applicable parameters according to the schedule outlined in the *Drinking Water Certification Manual.* With each parameter, spiking is performed according to method requirements. Recovery data is maintained and used for QA validation. In addition, analysis of an unknown Proficiency Testing (PT) sample for all regulated parameters is carried out annually as required by EPA to maintain certification. PT results are to be forwarded directly from the approved provider to the Region 3 office. (See Appendix O)

CORRECTIVE ACTION

When errors, deficiencies, or out-of-control situations exist, the QA program provides systematic procedures to resolve problems and restore proper functioning to the analytical system.

Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the acceptable windows for precision and accuracy
- Field reagent blanks and/or laboratory reagent blanks contain contaminants above acceptable levels.
- Undesirable trends are detected in spike recoveries or between duplicates
- There are unusual changes in detection limits
- Deficiencies are detected from the results of performance evaluation studies

Corrective action procedures are handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the laboratory supervisor for further investigation. Once resolved, the corrective action procedure is documented fully for future review and referral.

APPENDIX N

PRECISION AND ACCURACY SAMPLES

LABORATORY DUPLICATES	Two sample aliquots taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of lab duplicate 1 and lab duplicate 2 give a measure of the precision associated with laboratory procedures, but not with sample collection, preservation or storage procedures.
FIELD DUPLICATES	Two separate samples collected at the same time and placed under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analyses of field duplicate 1 and field duplicate 2 give a measure of the precision associated with sample collection, preservation and storage, as well as with laboratory procedures.
LABORATORY REAGENT BLANK (LRB)	An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, internal standards and surrogates that are used with other samples. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, the reagents, or the apparatus.
FIELD REAGENT BLANK (FRB)	Reagent water placed in a sample container in the laboratory and treated as a sample in all respects, including exposure to sample site conditions, storage, preservation and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.
LABORATORY PERFORMANCE CHECK SOLUTION	A solution of method analytes, surrogate compounds, and internal standards used to evaluate the performance of the instrument system with respect to a defined set of method criteria.
LABORATORY FORTIFIED BLANK (LFB)	An aliquot of reagent water to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.
LABORATORY FORTIFIED SAMPLE MATRIX, (LFM)	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured value in the LFM corrected for background concentrations.
QUALITY CONTROL SAMPLE (QCS)	A sample matrix containing method analytes or a solution of method analytes in a water miscible solvent which is used to fortify reagent water or environmental samples. The QCS is obtained from a source external to the Laboratory and is used to check laboratory performance with externally prepared test materials.
REPORTING LIMIT VERIFICATION (RLV)	An aliquot of reagent water is spike with a concentration of analyte that is equal to the lowest calibration standard used in the daily calibration of the instrument. The RLV is used to verify the Laboratories Reporting Limit.

PRECISION AND ACCURACY

Within this laboratory a variety of QCs are utilized to maintain proper precision and accuracy. Blanks, spikes, matrix spikes, duplicates, replicates, check standards, and Proficiency Testing samples are all part of the laboratory's on-going demonstration of capability.

PRECISION MONITORING

The routine analysis of duplicate samples generates information on reproducibility of laboratory data. The results of duplicate analyses of samples of comparable materials are available to generate statistical measurements of precision. Data for duplicate analyses are maintained and monitored on a continuing basis.

ACCURACY MONITORING

Matrix spikes, check standards and performance evaluation samples all provide information on the accuracy of the analytical procedures and equipment. Charts of percent recovery or percent of true value will be maintained for on-going accuracy monitoring. Control limits used are those specifically determined by a given method or those determined by Table IV-6 of the Certification Manual (p.24). The control limits are updated on a regular basis as data is produced.

APPENDIX O

PROFICIENCY TESTING PROCEDURE

EPA Region 3 must receive at least one acceptable Proficiency Testing Water Study (PTWS) result for all certifiable parameter(s) and by all method(s) for which this laboratory holds, or is seeking, certification by September 30 of each year. This laboratory must participate in a PTWS within the first three months of the calendar year, which has a closing date no later than March. The provider of the PTWS must be acceptable to the EPA Office of Ground Water and Drinking Water. A copy of the PTWS report must be submitted directly from the provider to the Regional Quality Assurance Office, 3ES10, at USEPA, Region 3, 1650 Arch Street, Philadelphia, PA 19103-2029.

PTWS samples are to be treated as normal drinking water samples. A PTWS sample shall be analyzed the same number of times as a routine drinking water compliance monitoring sample. The laboratory must analyze the sample by the approved method/SOP/instrument used by the laboratory for routine drinking water tests. When reporting results to the PTWS provider, the method's edition and revision, or section shall be included.

If a parameter, for which the laboratory has certification, is unacceptable in any PTWS report, a Corrective Action Report (CAR) must be written that describes the action taken by the laboratory to address and correct the problem. The CAR must be signed by the program manager/supervisor and a copy submitted to the Laboratory Director and the Regional Quality Assurance Office

A make-up PTWS must be analyzed for any parameter with unacceptable results on the initial PTWS. The laboratory may participate in as many PTWS as necessary during the make-up PTWS period (April 1st to September 30th) to achieve an acceptable result.

APPENDIX P

ACRONYMS

CAR	Corrective Action Report
DHHR	Department of Health and Human Resources
DOP	Division of Personal
EPA	Environmental Protection Agency
FC+	Fecal coliform positive
FC-	Fecal coliform negative
FDA	Food and Drug Administration
FRB	Field Reagent Blank
GW	Groundwater
GUDI	Groundwater Under Direct Influence
HPC	Heterotrophic Plate Count
ID	Identification
IDL	Instrument Detection Limit
LFB	Laboratory Fortified Blank
LFM	Laboratory Fortified Sample Matrix
LRB	Laboratory Reagent Blank
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDL	Method Detection Level
NPDWR	National Primary Drinking Water Regulations
OEHS	Office of Environmental Health Services
OLS	Office of Laboratory Services
OSHA	Occupational Safety and Health Administration
PT	Proficiency Testing
PTWS	Proficiency Testing Water Study
PWS	Public Water System
QA	Quality Assurance
QC	Quality Control
QCS	Quality Control Sample
QF	Quality Feedback Form

QM	Quality Management
RLV	Reporting Limit Verification
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SOP	Standard Operating Procedure
SW	Surface Water
SWEET	Safe Water Electronic Entry Tool
SWTR	Surface Water Treatment Rule
TC	Temperature Control
TC+	Total Coliform positive
TC-	Total Coliform negative
TCR	Total Coliform Rule
TNTC	Too-Numerous to Count

DEFINITION OF TERMS

Accuracy

This is a measurement of the closeness of an individual result or the average of a number of results to the true value.

Calibration

Comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustment.

Certifying Authority (CA)

This is a designee who has the authority to certify a laboratory conducting drinking water analyses.

Certification Officer (CO)

A person who evaluates laboratories to determine if they meet the criteria established in the NPDWR and within the policy requirements of this manual. This person must pass the certification officers training course provided by U.S. EPA Laboratory in Cincinnati, Ohio.

Chain-of-Custody

An unbroken trail of accountability that ensures the physical security of samples, data, and records.

Contaminant

Any physical, chemical, or biological substance or matter in water that is of public health or welfare concern.

Corrective Action Report (CAR)

This is a report that describes the actions taken to rectify conditions adverse to quality and where possible, to preclude their recurrence.

Community Water System

Public water system that serves at least 15 service connections used by year – round residents or regularly serves at least 25 year-round residents.

Data Audit

A qualitative and quantitative evaluation of the documentation and procedures associated with measurements to verify that the resulting data are acceptable.

Data Quality Objectives

Qualitative and quantitative specifications used to design a study that will limit uncertainty to an acceptable level.

Data Reduction

The process of transforming the number of data items by arithmetic or statistical calculation, standard curves, concentration factors, etc. and collation into a more useful form. Data reduction is irreversible and generally results in the loss of detail.

Document

Any written information describing, defining, reporting, certifying activities, requirements, or procedures results.

Groundwater

Subsurface water found in the saturated zone of a defined aquifer.

Groundwater – Under Direct Influence of surface water (GUDI)

Any water beneath the surface of the ground with (1) significant occurrence of large-diameter pathogens such as Giardia lamblia, or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.

Heterotrophic bacteria

A broad class of aerobic and facultative anaerobic organisms which use organic nutrients for growth. The group includes many innocuous bacteria, as well as virtually all of the bacteria pathogens. These bacteria infect when the host defenses are weakened.

Heterotrophic Plate Count (HPC)

The number of heterotrophic bacteria contained in a water sample.

Holding Time

The allowed time form when the sample was taken (or extracted) until it must be analyzed.

Initial Demonstration of Capability (IDC)

Before analyzing compliance samples a qualified technician must demonstrate the ability to achieve a low background, acceptable precision and accuracy specified for the method to be used, and determination of an MDL.

Instrument Detection Limit (IDL)

The concentration equivalent to the analyte signal which is three times the standard deviation of a series of ten replicate measurements of the calibration blank at the same wavelength.

Laboratory Reagent Blank

An aliquot of reagent water or other blank matrix that is treated exactly as a sample to determine if method analytes or other interferences are present.

Laboratory Fortified Blank

An aliquot of reagent water or other blank matrix to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample to determine whether the method is in control.

Manual for the Certification of Laboratories Analyzing Drinking Water (CLADW)

This manual is written by the EPA Office of Ground Water and Drinking Water and describes the implementation of the Drinking Water Laboratory Certification program, including the procedures a laboratory follows and the criteria a laboratory must meet to be certified to analyze drinking water compliance samples.

Maximum Contaminant Level

Maximum contaminant level means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

Monitoring Trigger

The concentration of a regulated contaminant which triggers additional monitoring.

Method

This is an analytical procedure that is approved to analyze drinking water for the purpose of compliance monitoring.

Method Detection Limit (MDL)

The minimum concentration, of an analyte that can be identified, measured and reported with 99% confidence, that the analyte concentration is greater than zero.

On-Site Audit

To assure the laboratory is maintaining the required standard of quality the certifying authority will conduct an on-site evaluation of the facility.

Precision

The reproducibility in a series of results, that will establish whether the testing method gives the same result under the same set of preparation and/or analytical conditions or sampling criteria.

Proficiency Testing Water Study (PTWS)

A sample provided to a laboratory to demonstrate that the laboratory has the ability to successfully analyze it within the acceptance limits listed in the NPDWR

Public Water System

A system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily as least 60 days out of the year.

Quality Assurance Plan (QA)

A document that describes management activities that involves planning, implementing, assessing, reporting and improving quality to ensure that a process, item, or service is of the type and quality needed and expected.

Quality Control

The overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of the user; operational techniques and activities that are used to fulfill requirements for quality.

Scientifically Valid and Defensible

The data generated by the laboratory follows all the mandatory and recommended procedures within the approved method, CLADW, NPDWR, laboratory SOP and the policy within this manual.

Standard Operating Procedure

A written document that details the method for an operation, analysis, or action which thoroughly describes techniques and steps, and is officially approved as the method for performing certain routine or repetitive tasks through the pre-analytical, analytical, and post-analytical steps.

Validation

Confirmation, by examination and provision, of objective evidence that specified requirements have been fulfilled. In design and development, verification concerns the process of examining a result of a given activity to determine conformance to the stated requirements for that activity.

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-103 Final Complete Report

Brenda Hall
Microbiologist
State of West Virginia
1948 Wiltshire Rd., Suite 7
District Environmental Lab
Kearneysville, WV 25430

EPA ID: WV01011
ERA Laboratory Code: S7444-01
Report Issued: 04/19/05
Study Dates: 02/14/05 - 03/31/05

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	MicrobE™ (Coliforms)						
0254	Sample 1 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 2 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 3 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0254	Sample 8 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 9 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B
0254	Sample 10 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 5, 7 and 10 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 1, 4 and 6 ATCC Strain #: 35030
- **Negative Coliform** organism - Proteus mirabilis, Samples 2 and 9 ATCC Strain #: 25933
- **Blank** - Samples 3 and 8

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP® Lab code: 200386-0

BENCH SHEET- Membrane

Lab Sample #	Code	Collect Date	Analy Date	County	Name/Co	Collector	Sample Loc	P/A24	Initials/Date/Time	Conf24	Conf48	Total	Fecal	RDate	Initials	Read Time
24760	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#1 31	+ 1	DW TG 3-22 3pm	+1		P	−1	323	TG DW	345pm
24761	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#2	− 1				A				
24762	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#3	− 1				A				
24763	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#4 13	+ 1		+1		P	−1			
24764	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#5 93	+ 1		+1		P	+1			
24765	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#6 25	+ 1		+1		P	−1			
24766	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#7 46	+ 1		+1		P	+1			
24767	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#8	− 1				A				
24768	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#9	− 1				A				
24769	1Q	3/20/2005	3/21/2005	KANAWHA	WS-103	ERA	#10 47	+ 1		+1		P	+1			

Media = 0
Pre Rinse = 0
Post Rinse = 0

Single Laurel
24760 +1
24763 +1
24764 +1
24765 +1
24766 +1
24769 +1

ENVIRONMENTAL
RESOURCE ASSOCIATES®
The Industry Standard™

February 10, 2006

Tom Ong
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

Enclosed is your final report for ERA's WatR™ Supply Proficiency Testing (PT) Study, WS-113. Your final report includes an evaluation of all results submitted by your laboratory to ERA. Attached is a table listing which regulatory agencies have been sent a copy of your final results and the report type received by those agencies.

Data Evaluation Protocols: All analytes in the WS-113 PT study have been evaluated using the following tiered approach. If the analyte is listed in the National Environmental Laboratory Accreditation Conference (NELAC) PT Field of Testing list (June 2005), the evaluation was completed by comparing the reported result to the acceptance limits generated using the criteria contained in the NELAC FoPT tables. If the analyte is not included in the NELAC FoPT tables, the reported result has been evaluated using the procedures outlined in ERA's Standard Operating Procedure for the Generation of Performance Acceptance Limits (SOP 0260).

Corrective Action Help: As part of your accreditation(s), you may be required to identify the root cause of any "Not Acceptable" results, implement the necessary corrective actions, and then satisfy your PT requirements by participating in a Supplemental (QuiK™ Response) or future ERA PT study. ERA's technical staff is available to help your laboratory resolve any technical issues that may be impairing your PT performance and possibly affecting your routine data quality. Our laboratory and technical staff have well over three hundred years of collective experience in performing the full range of environmental analyses. As part of our technical support, ERA offers QC samples that can be helpful in helping you work through your technical issues.

Thank you for your participation in ERA's WatR™ Supply Proficiency Testing Study, WS-113. If you have any questions, please contact myself, or Curtis Wood, Quality Assurance Director, at 1-800-372-0122.

Sincerely,

Shawn Kassner

Shawn Kassner
Proficiency Testing Manager

attachments
smk.

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Regulatory Agency	Agency Requested Report Type	Agency Lab ID	Contact
EPA Region 3,	Complete Report	WV00902	Charles Jones Jr.

ENVIRONMENTAL
RESOURCE ASSOCIATES®
The Industry Standard™

February 10, 2006

Tom Ong
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

In my role as ERA's Quality Assurance Director, I have independently reviewed all aspects of ERA's WatR™ Supply Proficiency Testing Study, WS-113, for compliance with all USEPA, NELAC, NIST NVLAP, and all state technical and program requirements in effect during this study, as well as those of our ISO 9001 Registered Quality System.

All aspects of ERA's WS-113 Study, from standard manufacture to final report generation, were completed by ERA in accordance with the "National Standards for Water Proficiency Testing Studies Criteria Document", USEPA December 30, 1998. ERA has reviewed all of the data that is contained in this report and has made every possible effort to make it complete, accurate and compliant. However, if you find anything in your report that you feel is incomplete, inaccurate or have any quality-related issues, please call me directly at 1-800-372-0122. As required by ERA Standard Operating Procedure for Handling Product and Service Problems (SOP 0150, Rev. 7.0), we will initiate an internal investigation and take corrective action as appropriate.

On behalf of ERA, thank you again for your participation in WS-113.

Sincerely,

Curtis J. Wood
Quality Assurance Director

ENVIRONMENTAL RESOURCE ASSOCIATES® WS-113 Definitions & Study Discussion

ERA Laboratory Code: W2144-01 EPA ID: WV00902

Report Issued: 02/10/06
Study Dates: 12/12/05 - 01/26/06

WS Study Definitions:

The Reported Value is the value that the laboratory reported to ERA.

The ERA Assigned Values are established per the USEPA/NELAC FoPT Tables, June 2005. A parameter not added to the standard is given an Assigned Value of "0" per the guidelines contained in the USEPA's Criteria Document and NELAC standards.

The Acceptance Limits are established per the criteria contained in the USEPA/NELAC FoPT Tables, June 2005, or ERA's SOP for the Generation of Performance Acceptance Limits™ as applicable.

The Performance Evaluation:

Acceptable	=	Reported Value falls within the Acceptance Limits.
Not Acceptable	=	Reported Value falls outside of the Acceptance Limits.
No Evaluation	=	Reported Value cannot be evaluated.

The Method Description is the method the laboratory reported to ERA.

Any Performance Evaluation left blank indicates results were evaluated as 'Not Reported'.

WS Study Discussion:

ERA's WatR™ Supply Proficiency Testing Study, WS-113, has been reviewed by ERA Senior Management and certified compliant with the requirements of the USEPA's National Standards for Water Proficiency Testing Studies Criteria Document (December 1998), and the criteria contained in the NELAC FoPT Tables, June 2005. ERA is a NIST NVLAP accredited PT Provider (Lab Code 200386-0).

This report contains data that are not covered by the NVLAP accreditation.

ERA's WatR™ Supply Study, WS-113, standards were examined for any anomalies. A full review of all homogeneity, stability and accuracy verification data was completed. All analytical verification data for all analytes in the WS-113 standards met the acceptance criteria contained in the USEPA's National Criteria Document for Water Proficiency Testing Studies, December 1998, and the criteria contained in the NELAC FoPT Tables, June 2005.

The data submitted by participating laboratories was also examined for study anomalies. There were no anomalies observed during the statistical review of the WS-113 data.

If you have any questions regarding ERA's WatR™ Supply Proficiency Testing Study, WS-113, please contact Shawn Kassner, Proficiency Testing Manager, or Curtis Wood, Quality Assurance Director, at 1-800-372-0122.

NVLAP®

ENVIRONMENTAL RESOURCE ASSOCIATES®

Study: **WS-113**

ERA Laboratory Code: **W2144-01**

Laboratory Name: **West Virginia Dept of Health**

Report Type: **Complete**

Report Method: **Method A**

ACCREDITED Lab Code: 1119-01

Proficiency Testing Studies / Quality Control Standards

NVLAP Lab Code: 200338-0

6000 West 54th Ave., Arvada, CO 80002 1-800-372-0122 fax 303-421-0159 info@eraqc.com www.eraqc.com

Tom Ong
Microbiologist Supervisor
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 02/10/06
Study Dates: 12/12/05 - 01/26/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
Heterotrophic Plate Count							
2555	Heterotrophic Plate Count	CFU/mL	230	231	135 - 397	Acceptable	SM 9215 B

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

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ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-113 Final Complete Report

Tom Ong
Microbiologist Supervisor
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 02/10/06
Study Dates: 12/12/05 - 01/26/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	WS Coliforms MicrobE™						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 2, 5 and 9 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 3, 6 and 7 ATCC Strain #: 35030
- **Negative (1) Coliform** organism - Proteus mirabilis, Sample 8 ATCC Strain #: 25933
- **Negative (2) Coliform** organism - Pseudomonas aeruginosa, Sample 10 ATCC Strain #: 27853
- **Blank** - Samples 1 and 4

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

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ENVIRONMENTAL
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The Industry Standard™

September 14, 2006

Thomas L. Ong
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

Enclosed is your final report for ERA's WatR™ Supply Proficiency Testing (PT) Study, WS-120. Your final report includes an evaluation of all results submitted by your laboratory to ERA. Attached is a table listing which regulatory agencies have been sent a copy of your final results and the report type received by those agencies.

Data Evaluation Protocols: All analytes in the WS-120 PT study have been evaluated using the following tiered approach. If the analyte is listed in the National Environmental Laboratory Accreditation Conference (NELAC) PT Field of Testing list (June 2005), the evaluation was completed by comparing the reported result to the acceptance limits generated using the criteria contained in the NELAC FoPT tables. If the analyte is not included in the NELAC FoPT tables, the reported result has been evaluated using the procedures outlined in ERA's Standard Operating Procedure for the Generation of Performance Acceptance Limits (SOP 0260).

Corrective Action Help: As part of your accreditation(s), you may be required to identify the root cause of any "Not Acceptable" results, implement the necessary corrective actions, and then satisfy your PT requirements by participating in a Supplemental (QuiK™ Response) or future ERA PT study. ERA's technical staff is available to help your laboratory resolve any technical issues that may be impairing your PT performance and possibly affecting your routine data quality. Our laboratory and technical staff have well over three hundred years of collective experience in performing the full range of environmental analyses. As part of our technical support, ERA offers QC samples that can be helpful in helping you work through your technical issues.

Thank you for your participation in ERA's WatR™ Supply Proficiency Testing Study, WS-120. If you have any questions, please contact myself, or Curtis Wood, Quality Assurance Director, at 1-800-372-0122.

Sincerely,

Shawn Kassner

Shawn Kassner
Proficiency Testing Manager

attachments
smk

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Regulatory Agency	Agency Requested Report Type	Agency Lab ID	Contact
EPA Region 3	Complete Report	WV00902	Charles Jones Jr.

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The Industry Standard™

September 14, 2006

Thomas L. Ong
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

In my role as ERA's Quality Assurance Director, I have independently reviewed all aspects of ERA's WatR™ Supply Proficiency Testing Study, WS-120, for compliance with all USEPA, NELAC, NIST NVLAP, and all state technical and program requirements in effect during this study, as well as those of our ISO 9001 Registered Quality System.

All aspects of ERA's WS-120 Study, from standard manufacture to final report generation, were completed by ERA in accordance with the "National Standards for Water Proficiency Testing Studies Criteria Document", USEPA December 30, 1998. ERA has reviewed all of the data that is contained in this report and has made every possible effort to make it complete, accurate and compliant. However, if you find anything in your report that you feel is incomplete, inaccurate or have any quality-related issues, please call me directly at 1-800-372-0122. As required by ERA Standard Operating Procedure for Handling Product and Service Problems (SOP 0150, Rev. 7.0), we will initiate an internal investigation and take corrective action as appropriate.

On behalf of ERA, thank you again for your participation in WS-120.

Sincerely,

Curtis J Wood

Curtis J. Wood
Quality Assurance Director

ENVIRONMENTAL RESOURCE ASSOCIATES® WS-120 Definitions & Study Discussion

ERA Laboratory Code: W2144-01 EPA ID: WV00902

Report Issued: 09/14/06
Study Dates: 07/10/06 - 08/24/06

WS Study Definitions:

The Reported Value is the value that the laboratory reported to ERA.

The ERA Assigned Values are established per the USEPA/NELAC FoPT Tables, June 2005. A parameter not added to the standard is given an Assigned Value of "0" per the guidelines contained in the USEPA's Criteria Document and NELAC standards.

The Acceptance Limits are established per the criteria contained in the USEPA/NELAC FoPT Tables, June 2005, or ERA's SOP for the Generation of Performance Acceptance Limits™ as applicable.

The Performance Evaluation:

Acceptable	= Reported Value falls within the Acceptance Limits.
Not Acceptable	= Reported Value falls outside of the Acceptance Limits.
No Evaluation	= Reported Value cannot be evaluated.

The Method Description is the method the laboratory reported to ERA.

Any Performance Evaluation left blank indicates results were evaluated as 'Not Reported'.

WS Study Discussion:

ERA's WatR™ Supply Proficiency Testing Study, WS-120, has been reviewed by ERA Senior Management and certified compliant with the requirements of the USEPA's National Standards for Water Proficiency Testing Studies Criteria Document (December 1998), and the criteria contained in the NELAC FoPT Tables, June 2005. ERA is a NIST NVLAP accredited PT Provider (Lab Code 200386-0).

This report contains data that are not covered by the NVLAP accreditation.

ERA's WatR™ Supply Study, WS-120, standards were examined for any anomalies. A full review of all homogeneity, stability and accuracy verification data was completed. All analytical verification data for all analytes in the WS-120 standards met the acceptance criteria contained in the USEPA's National Criteria Document for Water Proficiency Testing Studies, December 1998, and the criteria contained in the NELAC FoPT Tables, June 2005.

The data submitted by participating laboratories was also examined for study anomalies. There was one anomaly observed during the statistical review of the WS-120 data. This anomaly is addressed on the following page.

If you have any questions regarding ERA's WatR™ Supply Proficiency Testing Study, WS-120, please contact Shawn Kassner, Proficiency Testing Manager, or Curtis Wood, Quality Assurance Director, at 1-800-372-0122.

NVLAP®

ERA Laboratory Code: W2144-01 EPA ID: WV00902

Report Issued: 09/14/06
Study Dates: 07/10/06 - 08/24/06

- Study Discussion WS-120: Carbamate/Carbamoxyloxime Pesticides - Methiocarb

In reviewing the statistical data for the WS-120 Carbamate/Carbamoxyloxime Pesticides sample, ERA observed a failure rate of 37.5% for methiocarb. As we believe this failure rate is high, we carefully reviewed all data related to proving the efficacy of the standard including manufacturing and internal analytical verification data for both accuracy and homogeneity. Our review of the data confirmed that the standard is 'fit for use'.

The mean recovery of ERA's assigned value verification for methiocarb, conducted prior to the opening date of the WS-120 study, was 97.6% of the assigned value. The mean recovery of ERA's stability verification for methiocarb, conducted after the closing date of the WS-120 study, was 100% of the assigned value.

During the statistical review of the study data no method or technology biases or stability issues were noted. A review of the previous seven PT studies where methiocarb was present at similar concentrations did not show failure rate biases based on a concentration or a concentration range.

Sixteen laboratories reported results for methiocarb in the WS-120 study. Of the sixteen laboratories, 4 laboratories reported results below the lower acceptance limit and 2 laboratories reported results above the upper acceptance limit.

If you have any questions concerning the analysis of carbamate/carbamoxyloxime pesticides please feel free to call ERA's Organic Chemistry Group at 1-800-372-0122.

ENVIRONMENTAL RESOURCE ASSOCIATES®

Study: **WS-120**

ERA Laboratory Code: **W2144-01**

Laboratory Name: **West Virginia Dept of Health**

Report Type: **Complete**

Report Method: **Method A**

ACCREDITED Lab Code: 1539.01

Proficiency Testing Studies / Quality Control Standards

NVLAP Lab Code: 200386-0

6000 West 54th Ave., Arvada, CO 80002 1-800-372-0122 fax 303-421-0159 info@eraqc.com www.eraqc.com

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-120 Final Complete Report

Thomas L. Ong
Microbiologist Supervisor
West Virginia Dept of Health
Office of Laboratory Services
167 11th Ave
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 09/14/06
Study Dates: 07/10/06 - 08/24/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
SourceWatR™ E.coli							
2525	E.coli (MF)	CFU/100mL		29	7 - 123		
2525	E.coli (MPN)	MPN/100mL	56.3	47	23 - 96	Acceptable	SM9223 COLertQT

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP®

Tom Ong
<tomong@wvdhhr.org>
09/15/2006 08:56 AM

To Joe Slayton/ESC/R3/USEPA/US@EPA
cc Dave Russell/ESC/R3/USEPA/US@EPA
bcc
Subject WV - Micro WS Studies

Here are the 2004, 2005 and 2006 WS Micro Studies. We had a little problem in 2005. We did WS-103 for Membrane Filter (SM922B), but forgot to report them - oops! This is a method we don't do on SDWA compliance samples but none the less, keep our certification for it because it is used at labs we certify.

We also did WS-120 for E. coli enumeration by QuantiTray. The final report may be available by the time you all arrive. I have attached a copy of the preliminary report.

If you need anything else, just let me know.

Thomas L. Ong, Microbiologist Supervisor
Chief - Laboratory Certification Officer
Chief - Laboratory Evaluation Officer
WVDHHR - BPH
Office of Laboratory Services
167 - 11th Avenue
South Charleston, WV 25303
Phone: 304-558-3530, Ext. 2710
email: tomong@wvdhhr.org

WS-91.pdf WS-89.pdf WS-90.pdf WS-101.pdf WS-102.pdf WS-115.pdf WS-113.pdf WS-114.pdf report=WS120.pdf

	MF	Colilert	MPN
'04	✓WS-91	✓WS-90	✓WS-89
'05	*see above	✓WS-102	✓WS-101
'06	✓WS-115	✓WS-114	✓WS-113

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-91 Final Complete Report

Tom Ong
Microbiologist Supervisor
West Virginia Dept of Health
167 11th Ave
S Charleston, WV 25303
304-558-3530

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 04/21/04
Study Dates: 02/16/04 - 04/01/04

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	MicrobE™ (Coliforms)						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 3, 4 and 9 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 5, 7 and 8 ATCC Strain #: 35030
- **Negative Coliform** organism - Proteus mirabilis, Samples 2 and 10 ATCC Strain #: 25933
- **Blank** - Samples 1 and 6

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP® Lab code: 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-89 Final Complete Report

Tom Ong
West Virginia Dept of Health
167 11th Ave
S Charleston, WV 25303
304-558-3530

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 02/16/04
Study Dates: 12/15/03 - 01/29/04

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	MicrobE™ (Coliforms)						
0254	Sample 1 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 3, 4 and 10 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 1, 6 and 8 ATCC Strain #: 35030
- **Negative Coliform** organism - Proteus mirabilis, Samples 5 and 7 ATCC Strain #: 25933
- **Blank** - Samples 2 and 9

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP® Lab code: 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-90 Final Complete Report

Tom Ong
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West Virginia Dept of Health
167 11th Ave
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304-558-3530

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 03/18/04
Study Dates: 01/12/04 - 02/26/04

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	MicrobE™ (Coliforms)						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 2 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 5 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 6 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 8 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 9 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 10 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 7, 9 and 10 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 3, 4 and 8 ATCC Strain #: 35030
- **Negative Coliform** organism - Proteus mirabilis, Samples 2 and 6 ATCC Strain #: 25933
- **Blank** - Samples 1 and 5

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP® Lab code: 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES

WS-101 Final Complete Report

Tom Ong
Microbiologist Supervisor
West Virginia Dept of Health
167 11th Ave
Office of Laboratory Services
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 02/16/05
Study Dates: 12/13/04 - 01/27/05

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	MicrobE™ (Coliforms)						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 2, 3 and 7 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 4, 8 and 9 ATCC Strain #: 35030
- **Negative Coliform** organism - Proteus mirabilis, Samples 1 and 6 ATCC Strain #: 25933
- **Blank** - Samples 5 and 10

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP Lab code: 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-102 Final Complete Report

Tom Ong
Microbiologist Supervisor
West Virginia Dept of Health
167 11th Ave
Office of Laboratory Services
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 03/24/05
Study Dates: 01/17/05 - 03/03/05

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	MicrobE™ (Coliforms)						
0254	Sample 1 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 2 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 5 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 8 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 9 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 10 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 1, 6 & 7 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 3, 4 & 8 ATCC Strain #: 35030
- **Negative Coliform** organism - Proteus mirabilis, Samples 9 & 10 ATCC Strain #: 25933
- **Blank** - Samples 2 & 5

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP Lab code 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-115 Final Complete Report

Tom Ong
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West Virginia Dept of Health
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167 11th Ave
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 04/11/06
Study Dates: 02/06/06 - 03/23/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	WS Coliform MicrobE™						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform organism** - Escherichia coli, Samples 4, 5 and 10 ATCC Strain #: 35421
- **Total Coliform organism** - Enterobacter cloacae, Samples 2, 3 and 6 ATCC Strain #: 35030
- **Negative (1) Coliform organism** -Proteus mirabilis, Sample 7 ATCC Strain #: 25933
- **Negative (2) Coliform organism** -Pseudomonas aeruginosa, Sample 8 ATCC Strain #: 27853
- **Blank** - Samples 1 and 9

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP Lab code: 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-113 Final Complete Report

Tom Ong
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EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 02/10/06
Study Dates: 12/12/05 - 01/26/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	WS Coliforms MicrobE™						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221B LTB
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9221E LTB EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221B LTB
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9221E LTB EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform** organism - Escherichia coli, Samples 2, 5 and 9 ATCC Strain #: 35421
- **Total Coliform** organism - Enterobacter cloacae, Samples 3, 6 and 7 ATCC Strain #: 35030
- **Negative (1) Coliform** organism - Proteus mirabilis, Sample 8 ATCC Strain #: 25933
- **Negative (2) Coliform** organism - Pseudomonas aeruginosa, Sample 10 ATCC Strain #: 27853
- **Blank** - Samples 1 and 4

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP® Lab code: 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-114 Final Complete Report

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EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 03/16/06
Study Dates: 01/09/06 - 02/23/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	WS Coliforms MicrobE™						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 2 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 7 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 8 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0254	Sample 9 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9223 COLILERT
0254	Sample 10 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9223 COLILERT

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform organism** - Escherichia coli, Samples 2, 3 and 9 ATCC Strain #: 35421
- **Total Coliform organism** - Enterobacter cloacae, Samples 4, 5 and 6 ATCC Strain #: 35030
- **Negative (1) Coliform organism** -Proteus mirabilis, Sample 1 ATCC Strain #: 25933
- **Negative (2) Coliform organism** -Pseudomonas aeruginosa, Sample 8 ATCC Strain #: 27853
- **Blank** - Samples 7 and 10

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP Lab code 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®

WS-115 Final Complete Report

Tom Ong
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West Virginia Dept of Health
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167 11th Ave
S Charleston, WV 25303

EPA ID: WV00902
ERA Laboratory Code: W2144-01
Report Issued: 04/11/06
Study Dates: 02/06/06 - 03/23/06

Anal. No.	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description
	WS Coliform MicrobE™						
0254	Sample 1 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 1 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 2 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 2 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 3 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 3 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 4 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 4 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 5 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 5 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC
0254	Sample 6 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 6 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 7 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 7 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 8 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 8 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 9 Total Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B
0255	Sample 9 Fecal Coliforms †	CFU/100mL	Absence	Absence	Absence	Acceptable	SM9222B EC
0254	Sample 10 Total Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B
0255	Sample 10 Fecal Coliforms †	CFU/100mL	Presence	Presence	Presence	Acceptable	SM9222B EC

Total Coliform Evaluation : Acceptable
Fecal Coliform Evaluation : Acceptable

Definitions:

- **Assigned Value:** 'Presence' indicates organisms of the coliform group are present in the sample, 'Absence' indicates organisms of the coliform group are not present in the sample as defined by standard water testing methods.
- **Fecal Coliform organism** - Escherichia coli, Samples 4, 5 and 10 ATCC Strain #: 35421
- **Total Coliform organism** - Enterobacter cloacae, Samples 2, 3 and 6 ATCC Strain #: 35030
- **Negative (1) Coliform organism** -Proteus mirabilis, Sample 7 ATCC Strain #: 25933
- **Negative (2) Coliform organism** -Pseudomonas aeruginosa, Sample 8 ATCC Strain #: 27853
- **Blank** - Samples 1 and 9

All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01
† Indicates analytes included in ERA's NIST/NVLAP accreditation. Lab Code 200386-0

NVLAP® Lab code 200386-0

ENVIRONMENTAL RESOURCE ASSOCIATES®
The Industry Standard™

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WS-120 Study
Preliminary Report
For
West Virginia Dept of Health

A Preliminary Report of your results for ERA WS-120 Study is shown below. Preliminary Assigned Values and Acceptance Limits were established as required by the USEPA/NELAC criteria, state-specific PT program requirements or ERA's SOPs, as appropriate. Most certainly, the Preliminary Acceptance Limits should be considered as tentative pending ERA's analysis of the statistics from the participant data and our in-house analytical verification of the stability of each standard. While the majority of these preliminary values do not change as a result of our final review, a few do, which may result in a different final evaluation of your performance.

Depending on your laboratory's various accreditations, you may want to review your performance in prior studies for those analytes that it appears that the results you have reported are outside the Preliminary Acceptance Limits. You can quickly view your historical data by clicking on the 'Historical Data' button in the toolbar above or on the underlined analyte in the Preliminary Report.

Final reports will be available via *eDATA*™ or by mail within 21 days of the closing date of the study. In the interim, if you have any questions, please feel free to call ERA's PT group at 1-800-372-0122.

WS-120 Study
Preliminary Report

			Preliminary		

Analyte	Units	Reported Value	Assigned Value	Preliminary Acceptance Limits	Method Description
SourceWatR™ E.coli					
Method 1					
E.coli (MF)	CFU/100mL		46.0	Limits Based on Study Mean	
E.coli (MPN)	MPN/100mL	56.3	56.0	Limits Based on Study Mean	SM9223 COLertQT

CLOSE THIS WINDOW

Environmental Resource Associates
6000 West 54th Avenue, Arvada, CO 80002
PH. 800-372-0122 FAX (303) 421-0159
info@eraqc.com

Ex. 5 - Deliberative

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Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative